The Practical Teacher

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Edited by JOSEPH HUGHES.

'Knowledge is proud that he has learned so much,
Wisdom is humble that he knows no more.'—COWPER.

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CONVERSATIONAL DRAWING LESSONS FOR INFANTS.

BY MRS. E. MORTIMER,

Author of Practical Kindergarten Lessons for English Infant Schools; Lecturer on the Kindergarten at the Home and Colonial Training College.

XI.—VERTICAL LINES, 5 SQUARES LONG.

ONLY two of these exercises are given because those of X. (vertical lines 4 squares long) may again be made to apply to lines of 5 squares long.

XII.—COMBINATIONS OF VERTICAL LINES OF DIFFERENT LENGTHS, 1 TO 5 SQUARES LONG.

All the exercises given under IV. (combination of vertical lines 1 to 3 squares) may be used by adding the two longer lines of 4 and 5 squares. Besides these several others are given. It will be found that these require great care and accuracy. The children will have to count the spaces and lines, and be careful to draw the lines in their right places. The teacher also should be sure to make the children draw each line with one stroke of the pencil. Two spaces should be left between each repetition of a pattern, so that each one stands out quite distinct.

NOTES OF A LESSON ON PATTERN 7 (XII.).

The children to be provided with ruled books and nicely sharpened pencils, and the teacher to have a blackboard ruled like the children's books.

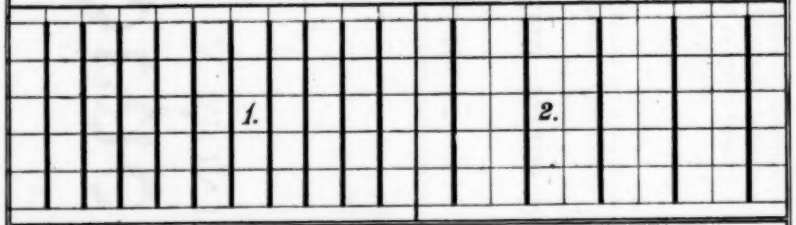
Now, children, look at the blackboard. Where have I put the chalk? On the top corner of the first square. Yes; now count each square as I point to it. The children count five. Yes; now I am going to put a tiny dot there, and now watch. What have I done? Drawn a line from the top of the first square to the dot. What kind of line? A long vertical line. Let me see who can draw a line like this one.

Now point to the next top corner and count two below it. How many corners will that make? Three. That is quite right; from there count four squares down and put a little mark. Now draw a line along the four squares. What kind of line have you just drawn? A vertical one. How many squares lower did you begin it? Where does it stop? One square lower than the first. Now look at the board while I draw the next line. Where did I begin it? Two squares lower than the last line. And where did I finish? One square lower than the last one. How long have I drawn it? Three squares long. The next line is to be two squares long, and I am going to begin it two squares lower than the last. How low down must I draw it? One square lower than the last. Now look again. What have I drawn now? A line one square long. Now let us see what we have drawn. A line 5 squares long, one 4 squares, one 3 squares, one 2 squares, and one 1 square. Where do the lines begin? Each one 2 squares lower than the last one. Now, how do they finish? Each one 1 square lower than the last one. Yes; you must notice very carefully that each line begins 2 squares lower and leaves off 1 square lower. Now, we have finished one part of the pattern, and we have three other parts to do before it is complete. I think you will be able to do the next more quickly. Which was the last line you drew? Yes, now draw another one by the side of it. We next want a line 2 squares long, just like the one on the other side. All of you try and draw it. That is right. I wonder who could draw the line 3 squares long. Well, Mary, you come and do it on the blackboard. That is right; now all do it. What other lines are there to draw? The 4 and 5 squares. Well, see if you can draw them like I do on the board. Now you see you have drawn the right-hand side exactly like the left. We have now drawn the top half of your pattern, and we have to make the bottom match the top half.

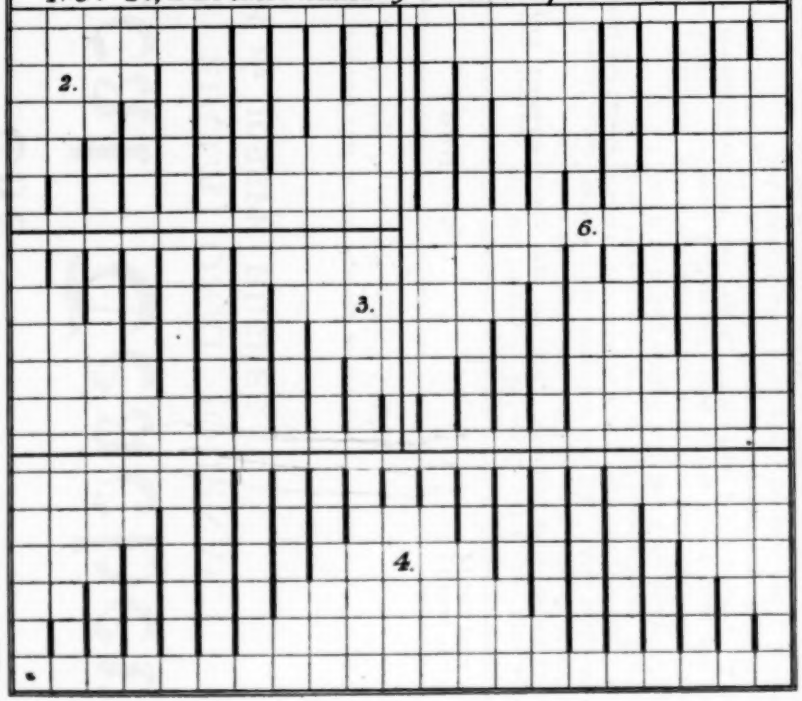
We must first draw on 1 square under the one square. Then for the next line begin 1 square lower, and draw down 2 squares. Now begin 1 square lower, and draw down 3 squares. The next line begin 1 square lower, and draw down 4 squares, and draw the last line down 5 squares. Is this part like the first? Yes, a little. What is the difference? It is turned upside down. How much lower down did you begin each line in the top part? And in the bottom part? Yes, in the top part you begin each line 2 squares lower than the last, and finish one square lower. In the bottom part you begin each line 1 square lower,

BRITISH MUSEUM

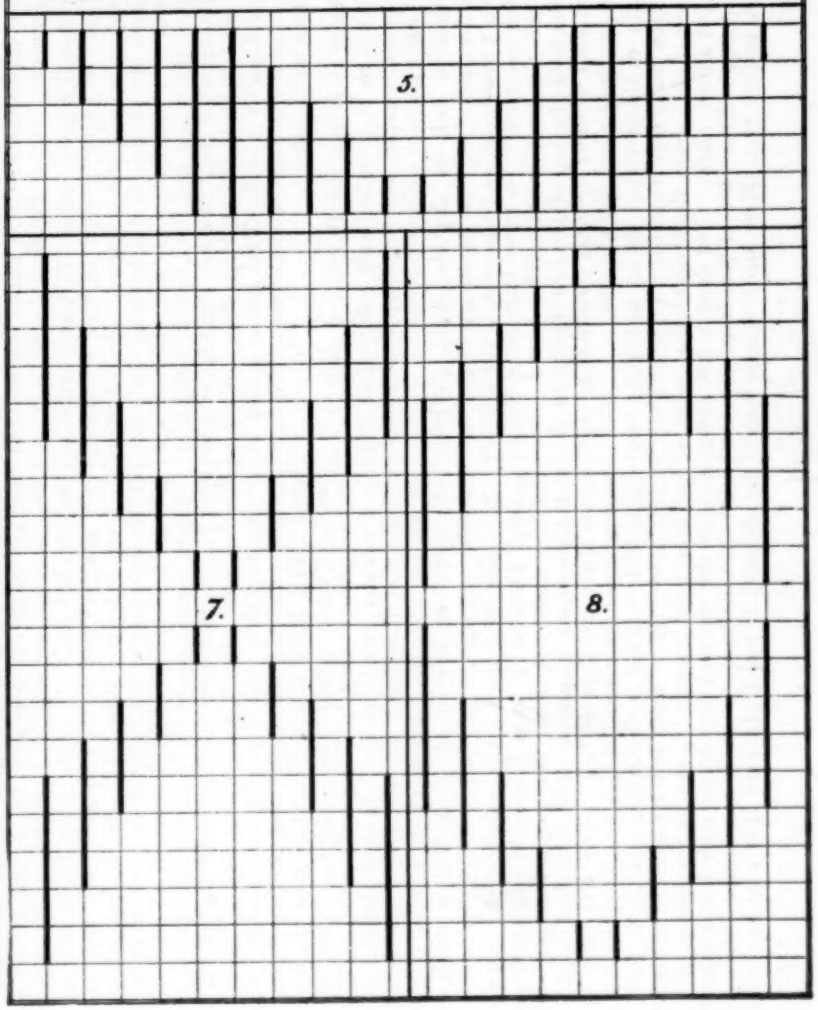
XI. *Vertical - 5 squares. Other exercises similar to* **X.**

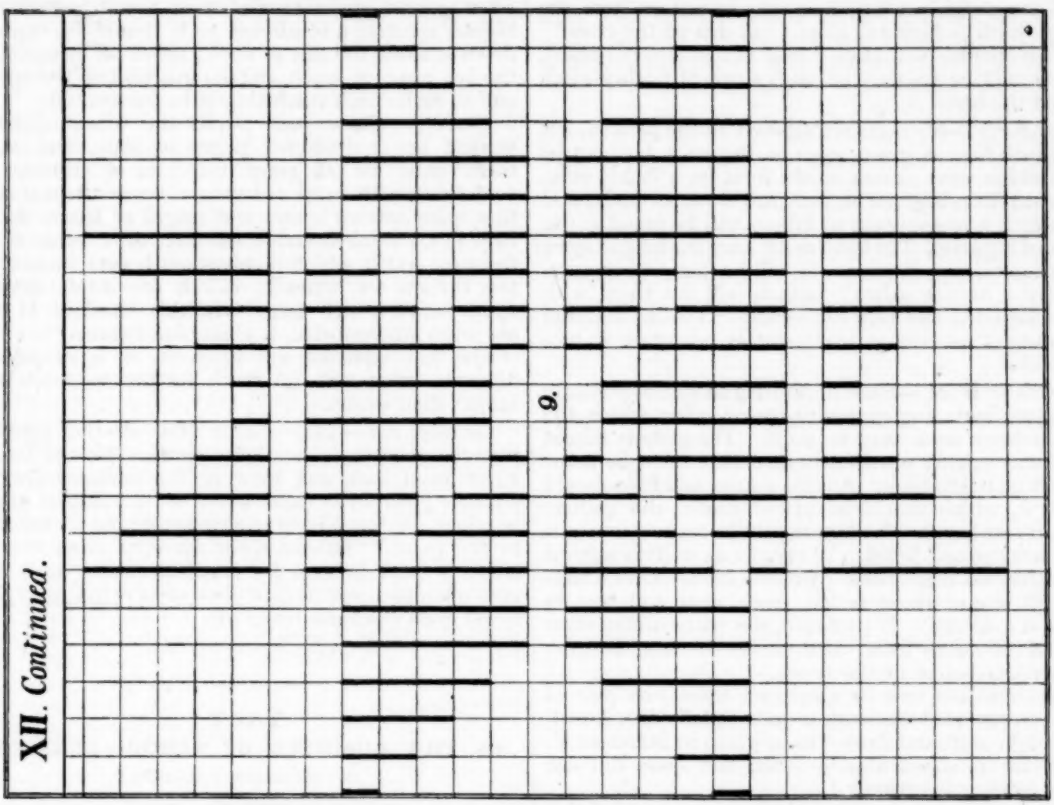


XII. *Combination of different lengths*
1. N°IV, with lines added of 4 and 5 squares.



XII. *Continued.*





and finish 2 squares lower. Now look at the pattern on the blackboard. Do you think it is finished? Well, what is there to do? Yes, the other half of the bottom. Try if you can draw it. Which part will you make it like? Like the bottom part that is done.

Now we will draw the pattern again. You must be careful where you begin. Look where my pencil is. On which line have I drawn? Yes, I have missed one line. Now you must miss one line, then begin your pattern, and see if you can do it very nicely. Draw very slowly, and mind you begin your lines in the right places. Do not forget that if you begin two below you end only one below, and when you have to begin one lower you finish two squares below.

(*To be continued.*)

PRACTICAL NEEDLEWORK.

BY J. W. WARREN,

Inspectress of Needlework, Leicester School Board.

My paper this month will be chiefly about the garments of Standard IV., and if time permit a talk about the specimens of Standard V.

On reference to the sheet it will be found that only a chemise and drawers are given. This lack of originality is intended, and will be made up for in the garments given in the next Standard by a *combination* garment, a *night-shirt* for a boy, and a delightfully hygienic high-necked *flannel petticoat*. On turning to the back garments it will be found that petticoat, pinafores, and apron have been given, and no more fitting Standard presents itself than IV. for the above old world simple garments.

In passing I may say that both chemise and drawers will fit a fair-sized girl of 8 years, though many children of 7 years amongst the lower classes and in country districts remote from towns wear this size.

Chemise pattern.—The sew and fell should not be less than quarter-inch, and the hem at bottom correspond with the neck-band, three-quarters of an inch will be found convenient. If it is liked better, the depth of shoulder can be augmented by leaving on to selvage, but even then the sleeve-opening must be hemmed. The band should measure 25 inches when finished. No opening must be made. In working put the band-seam at the back, and not, as so often placed, on shoulder. Let the girls *join* the band by *stitching* instead of *seam-stitch*, then open up this seam instead of felling. The fulness should be made by gathering the part indicated in the sheet; this work should be done the last of all after repeated practice in setting in of gathers has been given.

Band.—Fold it in two, half and quarter by a pencil-line, *open it up again* as directed in the specimen of gathering. This is urged after much experience of both plans. A moderately careful child *sometimes* sews down the back fold, but this cannot happen if the rule given is adhered to. Begin to set on the band at the right-hand back gathers point; thus you will do back gathers left shoulder, and afterwards front gathers, ending at back of right shoulder; no part of the garment will at any time during the putting on of band be in the hands of the child save the *band itself*.

Sleeve finish.—A false hem may be put on here the same width as hem and band ; cut this on the cross.

This chemise will answer well in half-scoured calico, and should be finished off with a row of feather-stitch round the band.

Drawers.—No tucks are allowed in the pattern, but a 1½-inch hem is given, open at the back, but can be used either way. Seam up the front for 4 inches only. A broad hem is given at back and front of body, and if pattern is properly cut no fulness will be found at the back of leg seam. The band needs a button-hole in front to fasten to stays if worn. It will be found economical to buy a narrow calico ; 32-inch will cut them with band included, and very little waste. Twilled material is strongest for this garment but is not quite so nice to work.

Mode of Work.—Each drawer-leg should be perfectly complete, including gathering-thread, after which the 4-inch front seam may be done. The gathers should be almost equally distributed, save that more by a few should go to the back. A large button and hole should finish it, which should be placed nearer the gathers than top of band. The legs should be seamed on right side, not run and felled. It may be as well to suggest here that no dual under-garment should have a run-and-fell seam ; there is too much wear and tear to make it available. If preferred, the pattern may slope instead of curve from back corner to hip, but the former sits better in the band.

Two children can be employed upon one pair of drawers, provided the work is quite equally distributed. The night shirt and flannel to be given in Standard V. paper are intended also for this, but space did not allow of their insertion.

This ends the garment and specimen work of this transitional standard. Standard V. will now be dealt with. Let us look not only at the garment work, but that required in the instructions. Here we find—

The *tuck specimen*, *calico patch*, *pinafore pattern*, *marking and darning a hole* constitute the new work for Standard V. A plate of the *patch*, *darning*, and *tucks* will accompany a later paper, with full and clear directions as to the best way of working them. Now a word about the marking.

You have to teach H E L I O T. Now I forms the foundation of *thirteen* letters to be taught, and enters largely into *six others*. There are *seven* more to teach, and of these O enters into five, leaving S and Z to be dealt with alone. You will therefore do well in this standard to teach I first, and then O. When I has been well taught, add to it the stitches forming H, then L, then T, then E. Let your pupils have a square of large plain canvas, but do not let them begin until you have patterned on the frame specimen sold for the purpose. Country schools can make this for themselves with a half-inch mesh by knitting. It is not necessary to make both marking sides alike, but great care and some practice is needed to get the outer threads of each stitch *running in the same direction* from *left to right*, and all the under threads from *right to left*. Each stitch should be finished before beginning the next, as a rule ; but where several stitches come together, as in E, it may be found simpler and neater to do the under threads, returning over the same ground back with the outer. The diagonal line of the stitch should be rendered by a *horizontal* or *perpendicular* stitch on the wrong side. This is too often ignored and a tangled mass found instead of a regular succession of stitches as it should be, running down or along the line of work ; fasten off by repeating the last piece of stitch and interthreading the cotton end at back ; each stitch should be fastened off.

Spacing.—Show your pupils the whole alphabet worked on a checkered paper or slate, and make them once for all grasp the idea of distance in connection with *width* of letters. Teach them at once that space *between* letters and *length* of letters do *not vary* in the same alphabet, but that each letter is not the same width, which involves much care in keeping four threads (or better to call it *two whole stitches*) width between each letter. In this standard H O T are seven stitches wide, L E six, and I three.

The full alphabet will be given in a subsequent diagram, as it will go much further to teach this subject than words.

Cutting out.—This should be of the simplest pattern possible, a straight pinafore pleated into a 2-inch band, back and front, or the ordinary Cottage pinafore given in so many works on this subject might be taken. As few directions as possible ; but let them be to the point. Labour spent on very minute exact finish is spent in vain for practical cutting out, and very often the general excellence of fit is lost by trying to get great exactness in detail.

(*To be continued.*)

TACT
IN THE BUSINESS OF SCHOOL-KEEPING.

BY RICHARD BALCHIN.

In our list of boys with special characteristics, whose right management demands tact on part of the educator, we have now to consider type number two.

'The vacant-stare, open-mouth boy.'

What to do with this type of boyhood is an educational problem, difficult of solution. Herbert Spencer says that the intellectual faculties unfold themselves in a certain order and at a certain rate. Now our young friend is not exactly an idiot, though closely allied to one. He has a certain amount of brain activity, though singularly small and so weak as to be almost imperceptible. His mental evolution is of so slow a growth, that the first or opening stage is seldom passed before the age at which, as by law established, he is free to leave school. Under the official system of so-called education, now happily becoming obsolete, this youth was expected to make annual progress equally with the rest of his fellows. Which curious fact clearly points out that Mrs. Burgwin, the newly-appointed Inspectress of Idiots under the London School Board, may profitably extend her sphere of visitation, and collect her *protégées* from other places than Board Schools.

As a key to the solution of this educational problem, let us bear in mind that at each stage of mental evolution the child should be brought under those educational influences which are exactly suited to that stage. There is no doubt whatever that the only possible teaching that can have the slightest chance of success here is 'objective.' Such a lad as the one under consideration will nearly always remain in the First Standard, whatever his age may be. And yet, under

an illogical system of classification, I have seen such a one in Standard III.! His vacant stare and open mouth during a grammar lesson furnished a real psychological study!

'What is the meaning of calling the Queen a "fountain of justice"?' asked Dr. Fitch, when questioning a class upon the meaning of the passage just read, at Gloucester Road Board School. No answer; whereupon the inspector explained the construction of a fountain with its jet of water rising into the air; or of a spring of water bubbling out of the ground, and pointed out that our Queen was the source or origin of justice. 'Hence,' said the doctor, 'you see why our good sovereign is called the fountain of——" 'Worter,' exclaims our young friend, whose mouth had, for the last few minutes, been opened to its widest possible extent. How shall this boy be managed? During a lesson he is looking straight at you, apparently paying the greatest attention; his eyes are wide open, 'Ay, but their sense is shut.' He simply sees and hears that you are talking about something; but not a single impression has been made upon his inner consciousness. As for abstractions and generalizations, he can form no such conceptions. A 'number' is to him a group of objects; and he has not the faintest perception of a common character among certain things, apart from those things, which leads him to make a generalization. Such a boy must remain in the 'preparatory' class, or at the best, in Standard I., where the teaching is, or should be, entirely concrete until, in the course of his mental evolution, he has progressed beyond the primitive stage.

We now pass on to consider the tact required in the management of

'The home-spoilt boy.'

This most unfortunate child, and truly objectionable character, is, together with his mother, and sometimes his father, a cause of endless trouble to his teacher. By a home-spoilt boy we mean one whose mental, moral, and sometimes physical nature has been most injuriously affected by wretched treatment on the part of densely ignorant parents.

Let us inquire first into the kind of home-training to which this lad has been subjected; second, the special characteristics which such training has developed; and then point out the means by which the evil results may be mitigated or removed by the teacher.

The unfortunate boy's *physical* growth is well nigh ruined by the mother, in giving the child whatever it whines and cries for as food, without any thought as to the suitability of that food. Then, when the proper hour for retiring to bed arrives, the child has only 'to cry to sit up,' for the mother to weakly give way, and thus curtail the necessary hours for sleep; nay, probably, the objectionable creature is allowed 'to sit up to supper,' and so goes to bed with a heavy load of utterly unsuitable food. All this is partly the result of ignorance on the part of the mother. How indeed is she to know better, having never learned? One of our greatest modern writers has pointed out that the nature and rearing of human offspring is the one subject that finds no place in the curriculum of studies for our girls and young women, mothers of the race that is to be. And this is so in a country where the greatest possible care is taken in the breeding and rearing of pigs, oxen, horses, and dogs!

Further, the *moral* growth of this boy is so lamentable, due entirely to the blighting influence of the home, that it would have been far better had his moral development been left to the discipline arising from the natural following of definite results from given causes. If a child puts his finger too near the fire he suffers pain; if he does the same thing a second time he suffers pain; a third time brings the same experience, until at last, finding that the same result always follows a certain course of action, he is disciplined into the abandonment of the *cause* of the pain. But in his home life this lad is never made to feel that wrongdoing is invariably followed by discomfort. Flat disobedience is to-day punished; to-morrow, passed by. Lying, is by the mother lightly—very lightly—censured at one time, and punished with brutal severity at another. The boy practises deception upon his companion and gains some advantage, whereupon the father half praises him, and tells him he will make a good business man. By and by, the lad deceives his father and gets a thrashing, although in all probability the second act of deception was less flagrant than the first.

A result of all this treatment is that the unfortunate teacher finds in his class a boy, who is a very incarnation of disobedience, lying, deceit, sulks, hypocrisy, greediness, and idleness. He is, moreover, weakly in body and an arrant coward.

How shall such an objectionable being be treated? The first absolute necessity is to inculcate the habit of obedience. He *must* be made to obey. For this purpose, I would begin by giving as few orders as possible, but every single breach must be instantly followed by punishment. The first punishment may take the form of standing out in some degraded position in front of the class for a time; after which, repeat the order. If it is not instantly obeyed have the lad caned in front of the others. When he has done crying, repeat the same order; if not obeyed, the caning must be renewed with greater severity, and this must, if necessary, be done day after day, to the exclusion of every other attempt at teaching this lad, until the particular order at first given is implicitly obeyed. When once the lesson of 'obedience' is well learned, there will be little trouble with most of the other faults. And, strange though it may seem, my experience tells me that this boy will in time come to respect and even love you.

INSPECTION OF A LONDON SCHOOL.

JANUARY, 1892.

We venture to place before our readers the following details respecting the recent Government examination of a large girls' school in the suburbs of London.

More than 550 names appeared on the schedule, but owing to the prevalence of influenza and other sickness, about thirty girls were absent, as well as some members of the staff.

Three inspectors attended and conducted the examination of the different standards, so that different kinds of work proceeded concurrently in different rooms, and most of the examination was completed in two days. Sample examination was adopted for all the standards below the sixth. Standards VI. and

VII., by the wish of the school authorities, were examined individually.

STANDARD I.

Arithmetic.—Four sums were dictated to the children tested in this subject.

1. Add 7, 9, 8, 690, and 7.
2. From 714 take 24.
3. From 800 take 2.
4. Take 16 from 470.

Answers.—(1) 721; (2) 690; (3) 798; (4) 454.

Writing.—*All* the children being supplied with slates and copies of Longman's New Geographical Readers, No. 1, were told to open their books at page 50, and begin transcribing. They had to go on till they had filled one side of the slate.

Reading.—About one-third of the class had to read, half of them being heard from the Holborn New Reader, No. 1, and half from Longman's Geographical Reader.

Geography.—About one-third of the class were told to stand, and were required to answer questions individually. Afterwards the whole class were questioned generally on the work of the standard. The following are examples of the questions asked by the inspector :—

What wall is this? (East.) And this? (N.E.)
Where is the north of this room?
Is it not up there? (pointing to the ceiling.)
Go and show me the north wall.
How many points of the compass are there?

Grammar.—What is a noun? Bring me a noun. Could you bring me one?

What does *s*, *h*, *i*, *p* spell? Well, this (pointing to the word) is not a ship, but only a word, so what else do we call it?

What are your books full of? (Words.)

Mental Arithmetic.—One-third of the class were required to stand, and were questioned individually. Then the whole class were questioned collectively.

Singing.—First the girls sang from the modulator to the sol-fa syllables. Next they had to sing to *laa* while the inspector pointed to the modulator.

The following list of songs was presented, and the fourth was heard by the inspector :—

1. 'Strike up the Music.'
2. 'To Thee, our Dear and Native Land.'
3. 'When the Morning Beams Arise.'
4. 'Away o'er the Sea.'
5. 'Action Song.'

Recitation.—Several pieces had been prepared, but the one presented was Santa Claus—'Hang up the Baby's Stocking.' About a dozen girls were selected, and each recited one verse.

STANDARD II.

Arithmetic.—The following sums were given out by the inspector once only, and rather quickly, and not repeated by the teacher :—

1. Add 24; 8,090; 100,000; 17,017; and 94.
2. From 100,000 take 1,010.
3. Divide 20,106 by 9.
4. Multiply 89,760 by 309.

Answer.—(1) 125,225; (2) 98,990; (3) 2,234; (4) 27,735,840.

Dictation.—The following passage from the Holborn New Reader No. 2, was dictated by the teacher. Not more than four mistakes were allowed for a pass.

'This kind of travelling was very pleasant when the weather was fine, and the journey not too long. But it was very different when the weather was wet or cold, and if the driver was careless the coach was upset, and some of the passengers hurt. Sometimes, too, bands of robbers stopped the coach and robbed the travellers.'

Reading.—About half the class were required to read, some from the Holborn Reader, and the rest from Longman's Geographical Reader No. 2.

Grammar.—This was tested from the Geographical Reader, beginning with page 1. The girls had alternately to pick out three nouns and three verbs round the class.

What is a rhyme? A nursery rhyme?
How many children can say a nursery rhyme?
(About twenty had to recite one—each taking a part.)
What is a noun? What is a verb?
What is a proper noun? Name some.
What is a common noun? Name some.

Geography.—The children had to turn to a picture of Vesuvius in their reading books, and were questioned thus :—

Why is it dark in the picture?
What is coming out of the mountain?
What is lava? Where does it come from?
Is it hot or cold? What does it turn to when cold?
What is the top of a volcano called?
What does it look like?
Point to water in the picture. Is it level?
(Pointing to south in picture.) If this is south where is the north? (Children pointed to the top of the picture. Inspector wanted them to point behind the mountains.)

The inspector then turned to the picture of the two hemispheres, page 38, and asked—What are these? Which is the more important one?

The children had to pick out the Continents and Oceans on the hemispheres, and were questioned minutely on all the different lines, etc., in this picture. A few definitions were also asked for.

Singing.—The following list of songs was prepared; but as the Inspector thoroughly examined all the other standards, he omitted singing in this standard.

1. 'Softly Falling Twilight Shadows.'
2. 'Oh, the Sports of Childhood.'
3. 'Catch the Sunshine.'
4. 'Summer Comes.'
5. 'If I were a Sunbeam.'

Recitation.—The piece recited was 'A Night with a Wolf,' by Bayard Taylor.

STANDARD III.

The class was divided into three groups, and one group was examined in each of the three ordinary subjects.

Arithmetic.—Specimen Cards.

A.—1. Divide 13,916 by 79.
2. From £1,000 subtract 16s. 5½d.
3. A boy went to the post-office to buy a pound's worth of halfpenny stamps. How many would he get?
4. A girl was 18 years old in 1872. How old will she be this year, 1892?

B.—1. Divide 4,387,297 by 79.

2. From £1,000 take £79 12s. 7½d.

3. A woman spent in a year £17 for food, £5 16s. for coals, and 2s. 6d. a week for dress. How many shillings did she spend altogether in a year?

4. Add £27 19s. 10½d., £4,064 13s. 5½d., £2,486,100 12s. 10½d., £10,486 19s. 8¼d., and £286 4s. 4d.

Answers.—A. (1) 176 + 12 over; (2) £999 3s. 6½d; (3) 480 stamps; (4) 38 years.

B. (1) 55,535 + 32 over; (2) £920 7s. 4½d; (3) 586s.; (4) £2,500,966 10s. 2¾d.

Dictation.—The following piece was dictated from Longman's New Geographical Reader, page 150:—

'There is a great contrast between the north and south of the county. While the former is part of the "Black Country," and is covered with mining and manufacturing towns, the latter consists of farms and orchards, and is a scene of quiet beauty.

'Upon the coal-field of the north stands Birmingham, the capital of the Midlands.'

Recitation.—The piece prepared was 'Not One to Spare.' Questions were asked on the meaning of the poem, not on the meaning of separate words; for example:—

What is the meaning of Not One to Spare?

Why do you think the parents could not spare one?

Who wanted one of the seven? What did the uncle promise? Why did the father hesitate about giving up the wayward child? and so on.

Geography.—Name an opening on the east coast of England. Another? Another?

What county is south of the Wash?

What county south of Norfolk? South of Suffolk?

What opening is between Essex and Kent?

Name two capes in Kent.

What county is west of Sussex?

West of that? And of that?

What large opening is in Hampshire?

Is Wales a part of England?

Questions were also asked on the manufactures of England, on the lakes, and on the rivers.

No map was used in the examination of this standard.

Grammar.—The children had to point out nouns, verbs, adjectives and pronouns in the reading lesson. Sentences had to be formed, and the girls were asked to tell the parts of speech in them.

What is an adverb? What does it do? What does it modify?

Give a sentence containing an adverb modifying a verb.

Give another in which an adverb modifies an adjective. Another with an adverb modifying another adverb.

What is a pronoun?

Singing.—The following was the list of songs prepared in this standard:—

1. 'Canadian Boat Song.'
2. 'Christmas Carol.'
3. 'Hope Will Banish Sorrow.'
4. 'Forest Echoes.'
5. 'Catch the Sunshine.'

Copy-books were given out, and each child had to hold her own up to be looked at.

Standard IV.

Arithmetic.—Specimen Card.

1. If a man had 2½d. more he could buy 15 books at 3s. 7½d each. How much money had he?

2. Reduce 17 tons 15 cwt. to half-pounds.

3. How many farthings in 518 guineas?

4. Multiply £7,983 18s. 6½d. by 13.

Answers.—(1) £2 14s. 2d.; (2) 79,520 half-pounds; (3) 522,144 farthings; (4) £103,791 1s. 0½d.

Dictation.—The test was chosen from Green's Spelling and Dictation Exercises, page 15.

'The elephant, however, in addition to its bodily strength, presents many remarkable features of character. It combines the fidelity of the dog, the endurance of the camel, and the docility of the horse, with great sagacity, prudence, and courage. The senses of smell, hearing, sight, and touch excel those of perhaps any other animal of the brute creation. Its powers of mind are not less well developed than its senses.'

Recitation.—The passage prepared was 'The Chase,' from Scott's 'Lady of the Lake.'

The Inspector began by asking what was referred to in the name 'The Chase,' and nearly all the questions bore on the meaning of the poem.

Grammar.—The girls were questioned closely on the verb, and were required to parse from the reading books—Holborn New Reader, No. 4.

Geography.—Most of the questioning was done by the teacher of the class, the Inspector interpolating questions from time to time.

Name the mountains of Scotland.

Give the chief heights in the Grampians, and in the Northern Highlands.

Where and what are the following:—

Tweed, Forth, Tay, Spey, and Clyde?

What do you know about Dundee and Peterhead?

Where are manufactured—linen, silk, iron, woollen goods, carpets?

Name and give position of ports of Scotland.

What are the boundaries of Ireland?

Where and what are Rathlin, Achill, Valentia?

Name some of the Irish lakes.

Name the largest isle in the British Isles.

Where are Kilkenny and Carlow, and for what are they noted?

Name the chief river of Ireland. Where does it rise, and what does it flow through?

Name an island west of British North America.

Where is Newfoundland, and for what is it noted? What kind of climate has it?

What are the people engaged in?

What animals are caught for their furs?

What name was given to the St. Lawrence?

What lakes does it flow through?

Singing.—The tests given included the following:—

1st. Modulator tests introducing changes of key.

2nd. *A Minor Test*:—

| l se l m l t d' l se l t d' r' l se l ‖

3rd. *Ear Tests*:—

d m r, m s f, d f d', s fe s, d l m, m s d', s m d', l f r

4th. *Time Test*:—Four pulse measure.

| 1 : 1 | 1 : — | 1 : 1.1 | 1 : — | 1 : | 1 : 1 | 1 : 1.1 | 1 : — |

5th. The third and fourth of the list of part songs prepared were sung to the Inspector.

1. 'May Morning.'
2. 'Come Again to your Fatherland.'
3. 'Hail to the Queen of the Silent Night.'
4. 'When up the Mountain.'
5. 'Home, Sweet Home.'

STANDARD V.

Arithmetic.—Specimen Cards :—

A 1. Find the value of $\frac{2}{5} + \frac{3}{4} - \frac{1}{6}$.

2. Make up a bill for 29 yards at 6¾d. per yard, 4 yards at 1s. 6d., 17 yards at 4½d., 2¾ yards at 6d. per yard.

3. If 40 men take 24 days to do a piece of work, how long will it take 9 men to do?

4. Find the rent of 17 acres, 19 poles, at £4 16s. per acre.

B 1. If a man walks 74 yards in one minute, how far would he walk in an hour?

2. $\frac{1}{4} + \frac{1}{8} + \frac{3}{4} + \frac{5}{16}$.

3. Find the cost of 1,842 articles at £7 16s. 8d. each.

4. Make a bill for the following :—

6 doz. articles at 10½d. each
27 articles at 1s. 6½d. „
4 doz. candles at 8d. per doz.
2 doz. and 3 boxes at 2s. per doz.

Answers.—A (1) $\frac{53}{60}$; (2) 16s. 3¾d. + 6s. + 6s. 4½d. + 1s. 4½d. = £1 10s. 0¾d; (3) 106⅔ days; (4) £82 3s. 4⅔d.

B (1) 2 miles 4 fur. 7 pls. 1½ yds; (2) 1⅝; (3) £14,429; (4) £3 3s. 0d. + £2 1s. 7½d. + 2s. 8d. + 4s. 6d. = £5 11s. 9½d.

Writing.—The girls who took this exercise were divided into three sets, one of which wrote a piece of dictation previously unseen, and the others the substance of one or other of two stories which were read out to them by the inspector. Before writing it they were asked if they had ever heard it before.

Dictation.—'The young sculptor cried out in alarm, declaring that the Prince Lorenzo would never forgive the introduction of so rude a piece of work among his treasures of art. To his astonishment the man declared that he was himself the prince, and that he set the highest value upon the new treasure.

"I am your protector and friend," he added. "Henceforth you shall be counted as my son, for you will become one of the great masters of art." This was overwhelming good fortune. Filled with joy, the lad went straightway to the house of his parents, and, forcing his way into his father's presence, told him what had happened.'

Composition.—Write the substance of the following story :—

'A lady kept a number of goldfish in a large glass bowl. Each morning it was part of her servant's duty to put fresh water into the bowl, to keep the fish clean and healthy. After a time the lady had occasion to change her servant. The new one was told that she must attend to the fish and see that they were clean every morning. A day or two later the lady noticed that some of the fish were dying, and their beautiful red scales were breaking. The following day she got up earlier than usual, and, greatly to her surprise, she saw the servant with the goldfish on the table, cleaning them with knife-polish. This is how she obeyed her mistress.'

Copy-books were shown by all the children in this standard.

Reading.—A section of this standard was heard to read, part from the Fifth Royal Star Reader, part from the Holborn Geographical Reader, and part from the 'School Newspaper.'

Grammar.—Two sentences, chosen by the children themselves, were written on the board to be parsed and analysed.

A 'At length we arrived in sight of Rotterdam.'
B 'They had no other homes than their boats.'

Each girl took part in the exercise. Some questions were given on word-building.

Recitation.—The passage prepared was Mark Antony's Oration from Shakespeare's 'Julius Caesar.' The girls recited individually and simultaneously. Questions were asked on the Life of Shakespeare and on his works. Explanations were required of Tragedy and Comedy. Questions were put on Julius Caesar and his invasion of Britain. Word-building tests were given on the words in the poetry—*e.g.*, *prepare*, *preparation*, *preparatory*.

The questioning was very minute, a meaning being required for almost every word in each line examined. Thus—

'If you have tears prepare to shed them now.' What are tears? Do they always express sorrow? What does 'to shed' mean? What animals shed anything? What do they do with it? What does 'to shed blood' mean?

Geography.—Children were referred to pictures in their books, and questioned on Monaco, its situation, description of the place, governor, etc. Historical facts were required about Calais, Orleans, Waterloo, Corunna, Moscow, the Simplon, Rome, etc.

The teacher questioned on Ranges of the Alps, a Coasting Journey from Malta to London, places whence Christmas goods come.

The inspector asked questions about the picture of 'the Armada' hanging on the wall. Each girl in the standard had to draw a map from memory, France, Italy, and Spain being given in rotation.

Drill.—This class, Standard V, was examined in the hall, as a sample to judge of the physical instruction given in the school. The system taught is specially arranged, and consists of movements adapted from the Swedish Drill of the London School Board, exercises from the work of Mr. Alexander, of the Liverpool Gymnasium, and several simple dance steps. The whole of the exercises are performed to suitable selections of dance and march music, played on the piano. Light dumb-bells and bar-bells are used in some of the exercises, but only the dumb-bells were used on the occasion of the examination. Besides the width-jumping of the Swedish system, charging with the dumb-bells, and the polka and schottische steps, the drill included the spiral maze at the double. The time occupied in the Drill Examination was fully half an hour.

Needlework.—This subject had been taught as an essential subject for the one shilling grant, the two subjects, English and Geography, having been prepared for examination as class subjects in addition to Drawing.

The girls were examined by sample, but as many as fifty-two were examined out of sixty-six present in Standard V, and an equal number of pieces were worked. The tests included calico patch, darn, marking, tucks, cutting a pattern of a child's pianofore, and knitting a Dutch heel. Garments had been prepared equal in number to one for each child in the standard.

The method of examination was similar in each of the standards.

Singing.—For this subject the three upper Standards, V., VI., and VII., had been taught as one class, and were examined together, a full half-hour being spent on the various tests, which included the following :—

Sight Tests.—Key D.

d m s d' s fe s l t d' s m l t l t d' ta l t r' d' ||

Key D.

l m l d' l se l d' t m t, d m l m l m l se l ||

Exercises were pointed on the modulator, including *four removes* to the right and left.

Voice and breathing exercises were given thus :—

Sing the scale through to each of the syllables '*laa*,' '*shaa*,' '*skaa*,' '*coo*,' '*aa*.'

Sing each note of the scale to four beats.

Sing the scale up and down in one breath.

The following *Ear Tests* were given :—

m s d' m; s fe f m; d' ta l t d'; s l s f m; r m f r; s d l s; m f r t, d; d f r s.

The list of part-songs and glees presented comprised—

1. 'Soldier Rest, thy Warfare O'er.'
2. 'Sweetly Sing the Song Birds.'
3. 'Softly Slumbering.'
4. 'Blow, Blow, thou Winter Wind.'
5. 'Boat Song.'

Two were sung—'Soldier Rest,' chosen by the Inspector, and 'Blow, Blow,' chosen by the teacher.

No special tests in time were given.

Standard VI.

Arithmetic.—Specimen Card.

1. A girl had a piece of calico to hem. When she had done $2\frac{1}{4}$ yards she found she had $\frac{2}{5}$ of the work still to do. How much had she to do altogether?

2. A boy and a girl take the same number of steps in a minute, but the boy's step is $\frac{1}{5}$ longer than the girl's. How far will the girl be behind when the boy has gone 3 miles?

3. At what rate per cent. will £540 amount to £598 10s. in $3\frac{1}{4}$ years.

4. Simplify $\dfrac{7\frac{1}{2}}{10} - \dfrac{1\frac{1}{2} - \frac{5}{6}}{1\frac{1}{4} + \frac{5}{6}} + \dfrac{3}{13}$.

Answers.—(1) $3\frac{3}{4}$ yards; (2) Half a mile; (3) $3\frac{1}{2}$; (4) $8\frac{859}{1300}$.

Composition.—The girls of Standards VI. and VII., being seated in the desks, each of them was supplied with a sheet of ordinary note paper and an envelope. The letters of the alphabet from A to Z were then allotted in succession to each of the sixty-three girls present. They were then told to write a letter on some subject, the name of which must begin with the letter falling to the lot of each individual child. To assist those having such an uncommon initial letter as X, the hint was given that they might take such a subject as *Xmas*. The letters had to be folded, placed in the envelopes, and properly addressed.

Reading.—This was heard from the current number of the 'School Newspaper.' All the girls in the Standard had to read, and were questioned fully on the meaning of the passages read.

Geography.—The geography of the Colonies had been prepared. The teacher questioned on the whole range of the subject, and the Inspector supplemented her examination with the following questions :—

What do you mean by climate?

Why is it cold in Arctic and Antarctic regions?

What does distance from the Equator cause?

Name a town on the Equator with a mild climate. (*Quito.*) Why is this so?

What has height to do with climate?

Name another cause which affects climate.

Why is it colder in Russia than in Scotland during winter?

Name another circumstance affecting climate.

Name any range of mountains which influences climate. How so?

What stream affects the climate of the British Isles? Why?

Map-drawing.—Each girl had to draw from one of three maps,—India, Australia, or Cape Colony.

Mental Arithmetic.—Instead of asking the usual kind of questions under this head, the Inspector selected from a card a sum in decimals, and questioned on the meaning of it, the notation, and method of working. He also asked the teacher to write on the blackboard a question in Ratio, and work it out with the children.

Recitation.—The passages prepared by the girls in Standards VI. and VII. were the Dialogue between Wolsey and Cromwell, and the Speech of Queen Katherine from Shakespeare's *Henry the Eighth.*

The Inspector allowed four children to be chosen by the teacher, and then chose four others. These he heard recite. When all the memory work had been done, the teacher was asked to question the class on the subject.

The meaning and roots of such words as *derived*, *dignities*, *fortitude*, and *service* were taken. Explanations were required of such lines as 'To-day he puts forth the tender leaves of hope.' The word *metaphor* being obtained in an answer, other examples of this figure of speech were asked for.

Grammar.—In this subject the Inspector questioned. For parsing and analysis he selected from the literature prepared, the sentence, 'Ladies, a general welcome salutes ye all : this night he dedicates to fair content and you.'

Questions were also asked on the sources of the English Language, on the derivation of the words, and particularly on the formation of nouns.

Standard VII.

Arithmetic.—Specimen Card.

1. Find by Practice the cost of 6 cwt. 3 qrs. 12 lbs. at £1 1s. per cwt.

2. A ship was insured at a premium of $3\frac{1}{2}$ per cent. The premium was £1,800. Find the value of the ship.

3. A cask of 15 gallons of wine cost 17s. 6d., or 1s. 2d. per gallon. Through waste three gallons were lost. Find the real cost per gallon.

4. How much stock can be brought at a discount of 8 per cent for £2,040?

Answers.—(1) £7 4s. 0d.; (2) £57,600; (3) 1s. 11d.; (4) £2,217 7s. 9$\frac{11}{13}$d.

Geography.—This standard had prepared the Geography of the United States. Questions were asked by the teacher on the history of the United States, the American War of Independence, Industries and Exports of the Country, the Railways, etc.

For Map-drawing the class was divided into three groups, and the girls in each group had to draw from memory a map or diagram. The three chosen for preparation were England and Wales, the United States, and a diagram of the Tides.

Reading, *Grammar*, *Recitation*, *Composition*, were taken as already shown with Standard VI. *Singing* was taken with Standards V. and VI. *Needlework* was examined as described under Standard V.

Domestic Economy.—Questions of the following type were written on the blackboard, and the girls of Standard VII., and some of Standards VI. and V., had to write answers.

1. Describe the substances starch, sugar, albumen, gluten and caseine, and say from what they are obtained.

2. Why do we need to take food, and what purpose does it serve?

3. What parts of the body is it most important to keep warm and dry in our climate?

4. Explain how personal cleanliness is essential to health.

No second specific subject was taken for examination; but cookery is taught in a kitchen specially built for the purpose, and more than 220 of the girls had been qualified for the cookery grant. The girls of Standard VII. are also prepared for the Science examinations in May in the subjects of Physiography and Geometry.

A YEAR'S HISTORY TEACHING.

BY H. LUCAS.

St. Thomas' School, Huddersfield.

(Continued from page 490.)

STUART PERIOD.

THOMAS WENTWORTH, Earl of Strafford (1593-1641), was born in London 1593, and was the son of Sir William Wentworth, owner of large estates in Yorkshire. He was educated at Cambridge, and afterwards travelled on the Continent. In 1614 he entered Parliament as member for Yorkshire. At first he opposed Charles, and stood up for the rights of Parliament. In 1627 Wentworth was imprisoned for refusing a forced loan, and in the following year he assisted in passing the Petition of Rights. It was also in this year that he left the popular side and joined the Court Party, thinking his old comrades too hard on the king. He was now made Baron Wentworth. On Buckingham's death (1628) he was made 'President of the Council of the North,' and in 1632 Deputy Lieutenant of Ireland. He improved the condition of that country, but was cruel and despotic. For this he was made Earl of Strafford.

He is best known for his plan called 'Thorough' for ruling England without Parliament. During the time Charles ruled with Parliament, Strafford was the chief means of raising illegal taxes. In 1640, along with Archbishop Laud, he was impeached, but the Lords threw out the bill. Then the Commons passed a Bill of Attainder against him. Charles reluctantly gave his consent—but for which he was afterwards sorry—after two days' hesitation. In May, 1641, Strafford was executed on Tower Hill.

ADMIRAL ROBERT BLAKE (1599-1657) was born at Bridgewater, in Somersetshire, where his father owned lands and ships. He was educated at Oxford, took M.A. degree, and afterwards sat in Parliament for his native town.

When the Civil War broke out Blake joined the popular side, and showed his skill as a general by the capture and defence of Taunton against the king's forces. For this he received the thanks of Parliament.

Charles's cousin, Prince Rupert, having command of the navy, Blake was summoned by Parliament to take the command. He greatly distinguished himself in the Dutch War, 1652-4. He remodelled the navy, and served with distinction in the Mediterranean, capturing Tunis.

He died off Plymouth, August 7th, 1657, on his return from an attack on Spanish ships laden with treasure. Blake was a pious and upright man, and was buried in Westminster Abbey.

JOHN MILTON (1608-1674) was the son of a scrivener, and was born in Bread-street, London, 1608. He received his early education at St. Paul's School, and afterwards went to Christ's College, Cambridge. Milton was originally intended for the Law or the Church, and he had a thorough knowledge of Latin, Greek, and Hebrew, as well as of modern languages. On leaving college he went to Italy, and returned about the time the dispute arose between king and Parliament. At this time he wrote pamphlets on civil and religious liberty, which greatly assisted the Parliamentarians. In 1649 Milton was appointed Latin Secretary to the 'Council of the State,' and he had a European reputation of being a thorough supporter of Cromwell. Through weakness and intense study he, in 1652, lost his eyesight.

At the Restoration, Milton's life was in some danger, for he had written against it. He was, however, included in the 'Act of Indemnity.' All his time was now devoted to writing, and the two great poems of his life now appeared—'Paradise Lost,' 1667, and 'Paradise Regained,' 1671. Amongst his shorter poems are 'Lycidas,' 'Comus,' 'L'Allegro,' and 'Il Penseroso.' He also wrote 'Samson Agonistes,' a dramatic poem. Milton died at Bunhill Fields, London, 1674, and was buried in the Parish Church of St Giles, Cripplegate.

JOHN CHURCHILL, Duke of Marlborough (1650-1723), was born at Ashe, Devonshire, June 24, 1650. He was educated at St. Paul's School, and at sixteen fought against the Moors at Tangiers, and shortly after on the Continent. In 1678 he married Sarah Jennings, the constant companion of Queen Anne.

King James created him Baron Churchill for helping to put down Monmouth's rebellion. At the Revolution, Churchill deserted James because the king wanted him to change his religion. He next threw in his lot with the Prince of Orange, who showed his gratitude by making him Duke of Marlborough. The king, however, had never much faith in his sincerity. Whilst serving in the Netherlands, Marlborough was deprived of command and sent to the Tower for being in traitorous correspondence with James II.

On the accession of Anne, he became the foremost man in England, being Captain-General of the Forces, and his son-in-law, Godolphin, head of the Treasury. It was, however, at the outbreak of the war of the Spanish Succession that he greatly distinguished himself. In 1704 he won the battle of Blenheim in Bavaria, defeating the allied armies of France and Bavaria, and taking Marshal Tallard prisoner. For this he received the estate at Woodstock and £500,000 to build Blenheim House. His other victories were, Ramillies (1706), Oudenarde (1708), and Malplaquet (1709). During these years he several times received the thanks of Parliament.

In 1712 he was dismissed the service for 'peculation,' and he retired to the Continent. On the accession of George I. he returned, and was appointed Commander-in-Chief.

He died in 1722 at Windsor Lodge, and was honoured with a public funeral in Westminster Abbey. His body was afterwards removed to Woodstock.

Marlborough was a handsome man, and had very courtly manners, but his great fault was his excessive love of money.

GEORGE VILLIERS, Duke of Buckingham (1592-1628), was born in 1592, and was a favourite of James I. and Charles I. James was struck by his good looks, and accomplishments in dancing and riding, and he rapidly promoted him through all grades of the peerage to Duke of Buckingham. He visited Spain along with Prince Charles to arrange a marriage, but the visit resulted in a war against that country.

Buckingham afterwards fetched Henrietta Maria from France to marry Charles. In 1626 he was blamed for the failure of the ex-

pedition against Cadiz, was impeached by Parliament, and was only saved by Charles dissolving it.

His expedition to Rochelle in 1627 to help the French Protestants was a complete failure, in spite of his own personal bravery. On account of these failures, and the bad advice he gave the king, he was very unpopular. Whilst planning a second expedition to Rochelle, 1628, he was stabbed at Portsmouth by Jno. Felton, a disappointed lieutenant.

JOHN HAMPDEN (1594–1643) was the eldest son of William Hampden, of Hampden, Bucks, and belonged to an old county family. His mother was aunt to Cromwell. After being educated at Oxford he studied law in London. He did not, however, follow his profession, but settled down as a country squire in Bucks. Elected as a member of Parliament for Bucks in 1621, he took little interest in public matters until the reign of Charles I., when he voted against the Court party, and attacked the Duke of Buckingham. He was twice imprisoned for refusing to pay forced loans, but was released when Charles summoned a new Parliament. When 'Ship Money' was levied in 1636 he refused to pay, and was tried before twelve judges, seven of whom declared against him. He was now the most popular man in England. He was a member of the famous Long Parliament which met in 1640, and was one of the five members Charles tried to arrest with an armed force.

On the commencement of the Civil War, Hampden raised a company of foot soldiers, known as 'Greencoats,' and subscribed £2,000 to the Parliamentary funds. He fought at Edge Hill and at the siege of Reading. At Charlgrove Field, in Oxford, he was wounded in the shoulder by two carbine balls, and expired on June 24th, six days after. He was buried in Hampden Churchyard.

Macaulay says that if he had lived he would have been the Washington of England.

HANOVERIAN PERIOD.

WILLIAM PITT, Earl of Chatham (1708–1778), the great Commoner, was the son of Mr. Robert Pitt, of Cornwall, and was born in 1708. At twenty years of age he entered the army as cornet in the Royal Horse Guards Blue. In 1735, however, he entered Parliament, and soon attracted attention by his attacks on Walpole. For this Walpole meanly dismissed him from the service. He was appointed in 1746 to a Cabinet Minister, and became Paymaster of the Forces. In this position he had ample chances of plundering the nation, as his predecessors had done; but he filled the post honourably, and won the goodwill of the nation. Both the king and the Duke of Cumberland disliked Pitt, but finding it impossible to form a Ministry without him, they yielded. In 1757 he took office under the Duke of Newcastle, but Pitt was really the head of the Government. During his term of office he acquired fame at home and made the name of England honoured abroad. As he appointed the best men to the highest posts in the army and navy, he saw Canada conquered, and the English army successful in all parts of the world. He resigned in 1761 as the king refused to follow his advice, and declare war against Spain.

In 1766 Pitt was made Earl of Chatham, and, in the House of Lords, denounced the measures taken against the colonists. Whilst doing so, he fell down in a fit. He was taken to his country seat at Hayes, in Kent, where he died after a few weeks' illness. He was buried in Westminster Abbey.

GEORGE CANNING (1770–1827) was born in London in 1770. He was educated at Eton and Oxford, and afterwards studied law. At twenty-three he entered Parliament as a supporter of the younger Pitt, and soon astonished his fellow members both by his speaking and prose writings. He held several minor offices until 1807, when he became Secretary for Foreign Affairs. This was in the Portland Ministry. He was the means of thwarting Napoleon in his designs against the British Navy, by sending the expedition to Copenhagen, and seizing the Danish Fleet. When the Ministry came to an end, Canning was returned as M.P. for Liverpool. From 1814 to 1820 he was British Minister at the Court of Portugal. When Lord Castlereagh committed suicide, in 1822, Canning became Foreign Secretary in the Liverpool Ministry. He was the means of making, with France and Russia, the 'Treaty of London,' which freed Greece from the yoke of Turkey. He was appointed Prime Minister in April, 1827, and died in August of the same year.

RICHARD COBDEN (1804–1865), the pioneer of Free Trade, was born in Sussex in 1804. He received little early education, and as a youth became an apprentice in a Manchester cotton warehouse, and in 1830 a proprietor of a cotton mill.

From 1834-38 he travelled both in the United States and on the Continent of Europe, and on his return published an account of his observations in pamphlet form.

His first great object was to get free trade in food. So in 1838 a body of Lancashire and Yorkshire merchants formed the 'Anti-Corn Law League' to repeal the Corn Laws. In 1841 Cobden was returned as member for Stockport. He and John Bright agitated for five years, both in and out of Parliament, for free trade. Time after time they were defeated in the House. They then used all their energy with the masses. The new penny postage helped them in distributing leaflets throughout the country, showing the folly of a duty on corn. In 1846 the Corn Laws were repealed, and Sir Robert Peel gave Cobden every credit for the measure. Cobden refused all honours offered him by the Queen; but £70,000 was gathered and given to him to cover his business losses during the agitation. In 1860 he negotiated a commercial treaty with France, having for its object a freer trading intercourse between the two countries.

He died in 1865 regretted by everybody. Throughout his whole life he was a strong advocate of peace.

HENRY JOHN TEMPLE, Viscount Palmerston (1784–1865), was educated at Harrow along with Robert Peel and Lord Byron. He afterwards studied at Edinburgh University, and had for his fellow pupils Sir Walter Scott and Lord John Russell. At nineteen he went to Cambridge, and three years after entered the House of Commons, and was soon appointed one of the Lords of the Admiralty. In 1809, though only twenty-five years of age, he became Secretary of War. For fifty-eight years he was a member of the House of Commons, and was Premier longer, and member of more governments than any other man.

In 1830, during Earl Grey's Ministry, he was made Foreign Secretary, and kept this post in all the Liberal Ministries until 1851.

He drove Lord John Russell from office in 1852; and in 1853, when Lord Aberdeen was Premier, Palmerston was Home Secretary. Whilst holding this office he effected many reforms, *e.g.*, issued tickets of leave to convicts, and improved the condition of factories and factory workers. He so gained public favour that, in 1855, he became Premier. Except for a few months in 1859, he retained this office until his death in October, 1865, at the age of eighty. He was buried in Westminster Abbey.

SIR ROBERT PEEL (1788-1850) was born in Lancashire in 1788, and was educated at Harrow and Oxford.

In 1809 he entered Parliament, and soon took up a subordinate post in the Percival Ministry until 1812, when he was appointed Chief Secretary of Ireland. Peel held this difficult post for six years.

In 1817 he was returned as member for Oxford University. Five years after he was appointed Home Secretary, and continued to hold it for the next seven years. During this time he made several reforms in criminal law—punishment of death being done away with, except for the greatest crimes. The London Police Force was also established.

Peel opposed Catholic Emancipation as long as he could, but when he saw that the country was determined to have it, he gave way, and brought forward the 'Catholic Emancipation Act.' This caused him to lose his seat for Oxford.

On the death of his father in 1830, he became Sir Robert Peel.

Sir Robert was returned for Tamworth in 1832, and remained member until his death. He opposed the Reform Bill of 1832.

Peel was Prime Minister for a short time, and in 1841 was again Premier with a strong working majority. He was convinced by Cobden that the duty on corn should be entirely done away with, and in 1846 the Corn Laws were repealed.

On June 29th, 1850, Sir Robert was riding in London, and was thrown over the animal's head. His collar-bone was broken and he died July 2nd, 1850.

LORD JOHN RUSSELL (1792-1878), a leading statesman and a son of the Duke of Bedford, was born in London, August 18th, 1792. He was educated at Westminster School and Edinburgh University.

Before he reached his twenty-first birthday he was returned as member of Parliament for Tavistock, but owing to feeble health he had to retire. In 1818 he re-entered Parliament and assumed the leadership of the party, having for its object parliamentary reform, and held that position for half a century.

In 1828 he carried the repeal of the Test and Corporation Acts, though opposed by Peel and Palmerston.

Whilst holding office under Lord Grey he brought in his famous Reform Bill giving members to new manufacturing and trading centres, and taking them away from decayed places. The king and Lords opposed the Bill, but it became law in 1832.

In Lord Melbourne's ministry he was Secretary of Home Department from 1835 to 1839. From 1839-1841 he was Secretary of State for the Colonies, and from 1846-1852 First Lord of the Treasury.

After this he held various offices under Lords Aberdeen and Palmerston, and on the latter's death, Russell again became Premier.

He was elevated to the peerage as Earl Russell in 1861. He spent the last twelve years of his life in domestic retirement and literary pursuits, and died in 1878.

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NEW DICTATION TESTS.

Suitable for 'Unseen Tests' in Reading also.

STANDARD IV.

No. 49.

Fruit should be taken on an empty stomach, or simply with bread; never with vegetables. In the morning, before the fast of the night has been broken, it is exceedingly refreshing. And to produce its fullest, finest effect, fruit should be ripe, sound, and in every way of good quality; moreover, it should be eaten raw. What is better than a bunch of grapes, or some pears, on an autumn morning the first thing on sitting down to breakfast, or a fine ripe apple, rich and juicy, eaten in the same way? In our climate, fruit and especially apples, should constitute the beginning of the meal.

No. 50.

Spiders display a sagacity akin to reason in the various methods employed to decoy their prey into their nets, or to catch it without exciting its fears, and secure it from escape. I saw one large spider save an enormous fly from breaking the net, by quickly binding his legs and wings, then running new lines from the fly back to the web, and then pulling him up by these lines. It exactly suggested a sailor fastening his line to an object, and pulling it in till it was made secure.

No. 51.

Building operations are so unusual that the fact that nine houses are in course of erection in the town is a subject of some comment. Such activity with bricks and mortar has not been known for many a year. The large business premises, which have been two years in course of construction, are now complete, and form quite an architectural feature in the principal street of the town.

No. 52.

A gentleman gives an account of a small spider being thrown into the web of a large one that hung among foliage about four feet from the ground. The large one rushed from its hiding-place under a leaf to attack the little one, which ran up one of the ascending lines that held the web. Finding itself likely to be overtaken, the little spider cut the line with one of its hind legs, when its pursuer was not more than an inch behind it, so that the large spider failed, and the little one secured a safe retreat by continuing along the ascending line.

No. 53.

Water answers so many purposes in nature, and is so valuable a servant to man, that it is worth while to inquire how it is placed within reach. The sea is a vast storehouse, and the air is the medium of transporting it over the earth. The clouds are formed of vapour, and deposit their substance as rain, hail, or snow. Then the mountains and hills are so formed as to gather the gifts from the clouds. These gifts are stored in reservoirs.

No. 54.

When the wind does not blow, the air is dry and pure, and unites with a productive soil to produce flowers and fruits, verdure and pasture, that will bear comparison with any other part of the globe. In the fertile valleys are beautiful gardens full of flowers and birds, surrounded by orchards and fig-trees, almonds, peaches, and apricots, and forests of boxwood and walnut, while the neighbouring hills are clothed with oak and chestnut trees. Here the deer and wild goats, the asses and bears, and the fierce lion and leopard, live and catch their prey.

No. 55.

The robbers ordered the driver to stop, and on his refusing to do so, they fired at the horses, killing one and injuring another. Then they entered the vehicle, robbing the passengers and seizing the mail-bags. One passenger told them that the watch he wore was not his own; this point was at once looked into, and being verified, the watch was restored. They took from the Major his gun, money, watch, and ring, and nearly all the clothes he wore, leaving him half-naked.

No. 56.

A statement is made, that when Her Majesty makes a journey by rail, she pays the companies at the rate of 7s. 6d. per mile for herself, besides first-class fare for everyone else travelling in the Royal train. It is quite true that the journey involves a temporary stoppage of traffic on the line, and perhaps a good deal of delay; but, reckoning the companies' loss on this account, Her Majesty is certainly by no means an unprofitable passenger.

No. 57.

Years ago, when negroes were kept in bondage, it was the custom when a slave was fortunate in finding a precious stone of more than the usual size, to confer upon him his liberty, which was done amid great rejoicing. Upon these occasions all labour was suspended for the day; the fortunate slave was taken in hand by his fellow-labourers, decked with flowers, crowned, and then carried with shouts and singing to the head director of the mines, who, with great ceremony, conferred upon him his freedom.

No. 58.

The books in the British Museum are bound on a principle, historical works being in red, poetical in yellow, and natural history in green. Besides this, each part of a volume is stamped with a mark by which it can be distinguished as national property, and which is of different colours; thus, red indicates that a book was purchased, blue that it came by copyright, and yellow that it was presented. This principle of binding might be followed out in private libraries.

No. 59.

Plants require drink as well as food, and the roots are the mouths that supply it with water. They also suck up a few other things as well, which are necessary, indeed, but far from forming the bulk of the nutriment. Many plants, however, don't need any roots at all, while none can get on without leaves as mouths and stomachs. That is to say, no true plant-like plants; for some plants are practically, to all intents and purposes, animals.

No. 60.

How fond we all are of jewels and personal decoration! The passion exists all over the world. Even the half-starved savage will gather the prettiest shells he can find on the seashore, and stringing them into a necklace, bedeck himself to the best advantage. In civilized countries the demand is principally for precious stones, and so it has come about that men have gradually found out how to develop the dull-looking rough diamond into a beautiful, glistening gem. In years long ago this stone was usually worn in its unpolished state.

No. 61.

To run an ostrich down is considered an impossibility, even by an Arab on his fleet steed. Its endurance is equal to its speed, as it can keep up the pace for hours together. . . The muscular strength of its great long legs is well adapted for running fast and far; and while on the run its hoofs make a clatter like those of a trotting horse, kicking violently large stones to the rear. When at full speed it spreads its white wing plumes, raising them over its back; but this is done only to balance it, as it cannot fly a single yard.

No. 62.

Be strong-minded enough to stand up for the right, to bear pain and danger in a good cause, to aid others in time of suffering, not to venture on what is called mean or degrading, to withstand a foolish fashion, to use your own judgment, to weigh the value of compliments. Be valiant, but do not be strong-minded in a bad sense, in discarding all the graces of humility, meekness and submission, which are the true strength and beauty of manhood.

No. 63.

'The blackbird's whistle is very human, like a human being playing the flute; an uncertain player, now drawing forth a bar of a beautiful melody and then losing it again. He does not know what quiver or what turn his note will take before it ends; the note leads him and completes itself. It is a song which strives to express

the singer's keen delight, the exquisite appreciation of the loveliness of the days; the golden glory of the meadow, the light, the shadows and the indolent clouds.

No. 64.

Spiders are excellent teachers of adapting means to ends. A good illustration of this is given in an account of three spiders combining to capture and secure a live striped snake, which they suspended by the tail, which was tied in a knot. They had also tied up his mouth securely by a great multitude of threads twisted round it. In accomplishing this feat a cord of great strength was made in the centre of the net, reaching its numerous filaments to all parts of the web above.

STANDARDS V.—VII.

No. 34.

The Lord Justice, in the course of an address to the graduates, said that although in recent times the State had put its finger upon education, it had by no means taken the whole of the province of education under its special charge. Education had been carried on ever since the memory of man through the facilities afforded by private benefactors; by the foundations which had been created in the past by wise, prudent, and benevolent men; and the Universities had figured in a very prominent way in developing, in elevating, and in testing the education of the country. The exquisite mixture of the social and intellectual atmospher the facilities for study, the resources which were furnished by their great libraries, gave Oxford and Cambridge the greatest influence in training our intellectual character.

No. 35.

Chinese lanterns are safe when they are properly handled, but they can and do catch fire if not held perfectly steady, as they were very unlikely to be by children of nine or ten years of age. What happened is only what might have been foreseen. While the little troop were proceeding from their dressing-room to the platform which was used as a stage, one of the lanterns caught fire; the flame instantly communicated itself to the dress, and from one spread to another, till the whole group seemed to be enveloped. Everything then seems to have been done that could be done to minimise the extent of the disaster. But it was too late, unfortunately.

No. 36.

Mr. Gladstone's intense earnestness and habit of concentration, as elements of character displayed in all he does, are seen in his determination not to miss a word of service or sermon, but to derive the fullest benefit from all. Mere curiosity, however, as to Mr. Gladstone himself is soon felt to be checked by the feeling his presence produces in the mind of any reverent worshipper. His presence is a silent sermon and a hallowing influence. He and his family, his trials and bereavement, his services, his aspirations, his religious faith and fervour, his hope and confidence as to the future beyond the grave—all these and many other considerations pass through the minds of those who are worshipping with him, put the abstract into concrete form, and impress the reality of religion as an inspiring and consoling force.

No. 37.

The *Standard* says: 'The death of Mr. W. H. Smith will be keenly felt and deeply deplored wherever sterling worth and solid talent devoted to the service of the State are held in honour. The long record of Parliamentary struggle in this country is illuminated by the names of many Statesmen of more brilliant natural parts and more dazzling achievements; but assuredly it contains none that rank higher in purity of aim and freedom from the taint of questionable conduct and the lower passions. In his public, as in his private life, the late First Lord of the Treasury was without reproach. No ill-natured word can be cited against him, no malevolent act, and no intriguing purpose.'

No. 38.

The coming-of-age of the *Graphic* is appropriately celebrated by the proprietors by the issue of a number which, if it be more or less of a personal character, is not the less a subject for public congratulation. It contains, besides portraits of its own staff, those of the founder of the *Illustrated London News*, his sons, and the art editor, and of German, French, and American journalists connected with illustrated periodicals. A coloured supplement reproduces in fine style five old-fashioned sporting pictures, and the rest of the letterpress and engraving is well up to date. The *Graphic* may certainly be congratulated on attaining its majority.

No. 39.

The Chairman, in opening the proceedings, said—This Association was founded three or four years ago for the purpose of promoting and extending technical instruction throughout the country, both in primary and secondary schools. By technical instruction we mean instruction in both elementary and secondary schools which has a direct bearing upon the industrial and commercial pursuits of the community, and which will have the practical effect of increasing the efficiency of labour in every branch of industry and commerce. By technical instruction in elementary schools we have in view a better training than that which now exists, so that it may have a direct bearing upon the future occupation of the scholars.

No. 40.

Of all the inevitable and oft-recurring torments by which our planet is racked, internally and externally, there is none so awful as an earthquake on a large scale, unless it be a tropical cyclone of the class that reduces scores of stout and well-found ships to mere shreds of wreckage within a few minutes, and conjures up unnumbered ranges of moving mountains from the broad, bright breast of Ocean. This latter marvel, however, is within the power of the volcanic action as well as of the wind. Science has ascertained that the larger number of these disturbances originate beneath the bed of the sea, and are in all probability caused by the flashing into steam of water which finds its way, through fissures, down to the underlying white-hot rocks.

No. 41.

Last year, principally through the exertions of some of the members of the Council, an Act was passed through Parliament which, for the first time, enabled local rates to be raised for the purpose of instituting or aiding technical instruction in certain local areas. This year a further great step in advance has been made. A large sum, exceeding £740,000, raised from the public revenue, has been placed at the disposal of the counties and local authorities for such purposes as they may think best. It may be devoted to the improvement of technical education either in whole or in part. It is very desirable that we should ascertain what are the prospects of a permanence of the grant.

No. 42.

The Postmaster-General will have a difficult problem to solve if he should find himself justified in displaying leniency towards repentant clerks, for it may be asked, Why should one branch of servants be treated differently to another class, and if postmen have been permitted to feel the bitterness of their folly why should better dressed and educated men escape? It is, however, hoped, by men who fully appreciate the delicacy of the question, that a solution of this difficulty is not impossible, especially if the want of it should stand in the way of a full restoration of friendly relations between masters and men in all branches of Government employ.

No. 43.

Before presenting the awards, the Duke of Fife reminded the students that though success in the battle of life was not given to all, yet each one of them by courage and industry could do something to add to his own happiness and the welfare of his neighbour. He was sure it was not without considerable self-denial and hard work that these prizes had been earned; but self-denial and hard work became easier by being practised, until that which seemed irksome ended by becoming simply a habit of life. It was impossible to exaggerate the importance of the handsome gift of the Drapers' Company; but he was certain that what would please that body best would be that their liberality should be utilised to the full.

No. 44.

In the course of his observations, the noble lord expressed his satisfaction at the growing efficiency and popularity of the Royal Navy. The wise measures introduced of late had added strength to every department of the naval service, and he had no doubt that the Royal Naval Exhibition had been productive of great advantage to the nation and satisfaction to the people. The army was less fortunate in its friends, being constantly attacked by critics on either side, their only point of agreement being a belief that everything was the fault of the Secretary of State. But, setting aside that unfortunate individual, he declared that the army was never in so good a condition as at present, its officers so thoroughly devoted to the study and practice of their profession, or its men so well trained and adapted for the work they might have to do.

No. 45.

Professional thieves are wise in their generation; they know how to make the education of children profitable; and by doing so they

raise up a second generation like themselves. But common prudence should teach those who have a stake in the world, and value reputation, that the proper means to grapple with this trouble is to forestall the dishonest, to obtain the custody of the orphan children, and so train them that they may belong to the ranks of the defenders rather than the assailants. Every well instructed youth is a gain to the community, an earner of wealth, a participant in public duties. This consideration should urge us to put beyond want an institution, the object of which is to save the uncontaminated boy and rear him to be an honest citizen.

No. 46.

In an age when, if actual improvement in morals, manners, and the machinery of civilisation is, perhaps, more talked about than achieved, but when humanity at large may at least be credited with a sincere desire for amelioration, it would be both impolitic and unjust to withhold applause and encouragement from the efforts of those who are seeking to bring about a reform in our children's toys. An energetic lady has matured a scheme for the stimulation of toy-making as a home industry, and she has even been adventurous enough to express her opinion that there is a large field for improvement in the designs of toys.

No. 47.

The ex-Emperor of Brazil kept his 66th birthday in Paris on Tuesday, mass being celebrated in his bedroom. He was a great traveller, and he has seen all that the most advanced civilisation has to show in extensive tours in Europe and in the United States. During his visit to England his ardour in the pursuit of knowledge took him from his bed at untimely hours, and made him a terror to sluggards in Government pay. The Americans took to him so much as freely to express their regret that he was not a Republican. However, he was far more useful as a monarch.

No. 48.

Sir William advanced and presented a gold badge of the association to the Princess, saying how anxious the council were to convey to Her Royal Highness their appreciation of all she had done for the association, and that if she would accept the badge she would inestimably add to its value. Princess Christian bowed, and immediately pinned the badge to her breast, and then began a long and quaint procession of nurses, each nurse receiving her badge from the hands of their Royal President. It was a very pretty scene—bright uniforms, crowned by the becoming caps, filled the hall, the gallery, and the platform, the brightest point of colouring rightly centring in the Princess.

No. 49.

The snowstorm which swept over London yesterday was not so heavy as to produce the disorganisation of traffic which resulted from the storms of three years ago. But from two to three inches of snow lay on the ground when the traffic of the day commenced, and vehicular locomotion was subjected to considerable inconvenience. In the morning there was almost a total absence of cabs from the ranks, and omnibuses had to travel very slowly owing to the slippery condition of the roads. Before daylight snow-ploughs were brought into requisition, and though in the north of London as many as four horses had to be used at first on both tramcars and omnibuses, it was not long before the tram lines were clear. All along the different routes tramway traffic was thus carried on without interruption.

NEW COMPOSITION STORIES.—STANDARD V.

Suitable for 'Unseen Tests' in Reading also.

No. 61.

STORY OF A PARROT.—The owner of a parrot possessed also a bull-terrier. The parrot was an observant bird, and he had picked up such expressions, as 'Choke 'em' and 'Shake 'em.' And he made use of these expressions often, and excited the dog thereby for no reason but wickedness. And the dog was disgusted thereat, because he was often deceived by the parrot. And it came to pass that one day the parrot used these expressions when he was down from his elevated perch, saying shrilly, 'Choke 'em'—'Shake 'em.' And the dog was moved to seize the parrot before he could regain his perch, and shook him, and half choked him, so that the parrot had but few feathers left upon him. And then, feeling satisfied, the bull-terrier let go his hold, and the parrot climbed up on his perch, hastily, but sadly. There the parrot plumed his few feathers and said, not shrilly, but as it were to himself: 'My fault is, I talk too much.'

No. 62.

WALNUTS.—The walnut was originally in England called the gaulnut, having been introduced from France. Towards the close of the 16th century walnuts were once found more effective than cannon balls. The town of Amiens was besieged by the Spaniards who were then in arms against the French. A small number of Spanish soldiers, disguised as French peasants, with a cart laden with sacks of walnuts, came to the gate, and asked permission to sell their fruit. On the gate being opened for them, one of the sacks, which was purposely left untied, fell (as designed) from the cart, and the French guard, busying themselves in picking up the scattered walnuts, were attacked by the disguised soldiers. Then a party of Spaniards, who were at hand in ambush, rushed forward, surprised, and took the town.

No. 63.

A MAYOR FINING HIS OWN MOTHER.—There has been in modern times no more signal instance of devotion to public duty at the expense of private ties, than was exemplified in the career of the late General Macauley, who was at one time the mayor of a certain town. A city bye-law had been passed directed against furious driving, and the mayor had to enforce it. As luck would have it, the first person brought before him was his own mother, an old lady who was very fond of driving fast horses whose pace had exceeded the regulations. The general, sitting in court, looked up and saw the old lady under the escort of a policeman. He, however, called the case and looked quite unconcerned. The officer having related the circumstances under which Mrs. Macauley was arrested, her distinguished son on the bench asked severely whether she had anything to say. 'No,' said the old lady. 'Ten dollars,' said the mayor, and went on to the next case, while his mother put down the sum and walked out of court.

No. 64.

THE ROMANCE OF A CHICKEN.—A young French boy, during his school holidays, once made a pet of a chicken. By throwing it some grain or bread-crumbs every morning, the chicken at last got into the way of following him about the house. The lad used to go to a seat in the garden, and the fowl would jump up beside him, pick food from his hand, and allow its head and back to be stroked. But the boy's holidays came to an end, and he went back to school. At first, the chicken did not seem to miss him, and took its food with the other fowls. When, however, after a few days had passed the chicken began to realise that its young master was gone for good, it became sad and cast-down. Morning after morning it hung about the house, as if waiting for its friend. At length, it went to the bench in the summer-house and stopped there day and night with its head beneath its wing, refusing even the most tempting bits of food. Its intention to starve itself to death soon grew so clear, that it was thought more merciful to kill it and put it out of its agony.

No. 65.

THE BOYS AND THE FIRE-ALARM.—Five youths stood admiringly around a fire-alarm, but failed to comprehend the purpose of the fiery-coloured post. A bigger boy came up, and explained to them that the instrument had been erected by a considerate County Council solely for the amusement of the youths of the locality who desired to see stirring sights. All they had to do was to break the glass and ring the bell, when they would see 'soldiers in shiny hats drive by on a chariot drawn by prancing steeds.' After thus exciting the curiosity of the urchins, the larger boy discreetly left. One of the five broke the glass, another rang the bell, and the whole stood eagerly around the mysterious post to see the spectacle. Sure enough, in a few minutes an engine came rushing past, the firemen upon it clad in their uniforms and wearing their burnished helmets. The lads really believed that the 'show' had actually been got up for their amusement, until the 'soldiers in the shiny hats' came back from a fruitless search of a fire and took the boys to the police-station. Afterwards they appeared at the police court, where the magistrate duly admonished them on their foolishness, but believed the 'bigger boy' had wilfully misled them. He therefore set them at liberty on condition that their parents suitably chastised them.

No. 66.

ORIGIN OF THE BLACK DOLL AS A SIGN AT RAG SHOPS.—This sign was first used by a man who kept a shop for rags in London at the beginning of the last century. An old woman brought him a large bundle for sale, but desired that it might remain unopened till she called again to see it weighed. Several weeks elapsed, and as the woman failed to make her appearance, the master of the shop opened the bundle, wherein he found a black doll, neatly dressed, with a pair of earrings appended to its ears. This he hung up over

the door, for the purpose of being owned by the person who had left it. Shortly after this she called, and presented the doll to the shopkeeper as a mark of gratitude for having by this means enabled her to find her bundle. The story having gained circulation, this figure has been generally used by dealers in rags ever since.

No. 67.

THE SWEARER REBUKED.—A lady on her way from Edinburgh to Glasgow in the stage coach was very much annoyed by a young military officer whose conversation was interspersed with oaths. She sat very uneasy till she could no longer keep silence. 'Sir,' said she to the officer, 'can you talk in the Gaelic tongue?' To this he replied in the affirmative, seemingly with great pleasure, expecting to have some conversation with the lady in that dialect. She then politely requested that if he wished to swear any more it might be in that language, as the practice of swearing was very offensive to herself and the rest of the company. The officer was quite confounded at the smart reproof, and no more oaths were heard from him during the remainder of the journey.

No. 68.

THE DUKE AND THE TOAD.—As the Duke of Wellington was walking in his garden he saw a boy, whom he recognised as the son of one of his gardeners, looking at something on the ground. On coming close to him, he perceived that he was crying bitterly. He asked the boy what was wrong. 'Please, sir,' said the boy, 'they are going to send me away to school, and then there will be no one to look after my poor toad.' The kind duke gave the boy a guinea, and when he was away at school wrote him a letter telling him how his toad was getting on.

No. 69.

SAVING FOR CHARITY.—Two persons, who were employed in collecting money for a charity, knocked at the door of a gentleman's house to solicit a donation. While waiting, they overheard the master of the house reproving a servant for the waste of a small piece of candle. Judging from this that he was a covetous man, one proposed that they should leave and go to another house; the other thought it best to stay. At length they were introduced, when the gentleman having read their case, presented them with five guineas. The collectors could not conceal their surprise, which being observed by the donor, he desired to know why they expressed so much wonder. 'The reason, Sir,' said one of them, 'is this: we happened to hear you blaming your servant for wasting an inch of candle, and therefore expected nothing from you.' 'Gentlemen,' replied he, 'it is true. I am very exact and cannot endure the waste of anything. I do this that I may save out of a moderate income to give away to works of charity.'

No. 70.

STORY OF THE ROYAL EXCHANGE.—Sir Thomas Gresham, who built the Royal Exchange in London, was the son of a poor woman, who, while he was an infant, abandoned him in a field. The chirping of a grasshopper, however, attracted a boy to the spot where the child lay, and his life was by this means preserved. After Sir Thomas had, by his unparalleled success as a merchant, risen to wealth and greatness, he chose a grasshopper for his crest; and becoming the founder of the Royal Exchange, his crest was placed on the walls of the building in several parts, and a weathercock in the figure of a grasshopper was fixed on the summit of the tower.

No. 71.

THE TWO FARMERS.—Two farmers had a dispute about some property which they could not settle, and therefore an action was brought to determine it. On the day of the trial one of the farmers called upon the other to accompany him to the Judge, when he found his neighbour at work on his ground, on which he said, 'Is it possible that you have forgotten that our cause is to be decided to-day?' 'No,' said the other, 'I have not forgotten it, but I cannot well spare the time to go; I knew you would be there, and I am sure you are an honest man, and will say nothing but the truth. You will state the matter fairly, and justice will be done.' And so it turned out, for the farmer who attended stated his neighbour's claims so clearly, that he lost the case, and returned home to inform him that he had gained the property.

No. 72.

GUY'S Hospital has now got a dog of its own. A few days ago it was seen to enter the hospital ground, hopping on three legs in the direction of the patients' entrance. Some children drew the attention of a student to the animal, and he took it into the surgery, where an examination showed that it was suffering from a broken leg. The injured limb was set. The leg soon regained its strength, the splints were removed, and the dog was shown the doorway; but the grateful animal refused to take its discharge from the surgery, where the students had been very kind to it. The dog is a black and white mongrel, and has been named 'Jack.' Jack is not like the other hospital dogs, who, when they have been cured, go back to the streets and bring to the institution other fourfooted patients to be similarly treated; he stays at his new home, and minds his own business.

No. 73.

A STRANGE MISTAKE.—A gentleman was standing one evening, not long ago, in one of the shadowy streets of Rome, when he was somewhat brusquely hustled by a passing figure. With a quick instinct, he clasped his hand to his watch-pocket. His watch was gone! He darted after the thief, who turned sharply round, at the same time clutching a watch. 'Give me that watch!' He made a dash, the stolen property was recovered, and the startled robber disappeared. What was the gentleman's consternation on entering his bedroom to find his own watch, which he had forgotten to put on, staring him in the face from the mantelpiece! *He* had been the thief, and the other wretched man had stumbled over him in the dark, and when overtaken and stopped, was merely clutching his own watch, which he had not the nerve to rescue from the tourist.

No. 74.

A STORY OF CHARLES FOX AND THE PRINCE OF WALES.—It is related of Charles James Fox, that walking up St. James's Street from one of the club-houses with the Prince of Wales, he laid him a wager that he would see more cats than the Prince in his walk, and that he might take which side of the street he liked. When they reached the top, it was found that Mr. Fox had seen thirteen cats and the Prince not one. The royal personage asked for an explanation. Mr. Fox said, 'Your Royal Highness took, of course, the shady side of the way as most agreeable; I knew that the sunny side would be left for me, and cats always prefer the sunshine.'

No. 75.

MAY'S BIRTHDAY.—'Many happy returns of the day!' were the words that greeted May as she came down to breakfast on her birthday. Three letters had come to her by post; one containing a half-sovereign from her mother. May was quite enchanted with her present, and asked her aunt if she might go with the nurse to buy a doll she had seen in the shop window. Having gained permission, May and her nurse set out to purchase the doll. They had not gone far when she suddenly exclaimed, 'Look, nurse, at that poor, ragged, little girl, with no shoes or stockings on! I do wish I had something to give her.' 'I do not believe in giving to those beggars, miss,' answered the nurse; 'and we must be quick or we shall never get to the shop to-day.' May was not talking, but thinking of the poor little girl who had attracted her notice. Presently she saw the child run up to an old gentleman and ask him to 'spare a copper;' but, on being refused, she walked on, looking very miserable. At last May said to her nurse, 'If only my half-sovereign was in silver, I could give the little girl a shilling.' 'Then you would not be able to buy the doll you want so much,' answered the nurse. 'I could do without it altogether, or get a less expensive one. She wants something to eat more than I want a doll.' Before the nurse could say anything, May rushed down the street, calling out, 'Little girl, little girl! take this!' but in the noise and confusion of the London street, the child heard not. Presently a little girl was picked up insensible. It was little May, who had been run over. The half-sovereign was dropped in the confusion, and was lost. May never recovered; but whenever she was impatient, her mother always reminded her she was giving up something she wanted for herself when she met with her accident.

No. 76.

THE SCOTCH BAILIES.—A story is told regarding six Scotch Councillors who came up to town to present an address of congratulation to Her Majesty on the occasion of her jubilee. They asked, it is said, what they had to do on entering the Queen's presence, and were told that they should kiss hands. Thereupon Councillor No. 1, as he stalked solemnly past the throne, raised his hand to his mouth and blew Her Majesty a kiss. The remaining five followed suit, till the Queen had a fit of the heartiest laughter she has enjoyed for a long time.

No. 77.

SAVED BY A TURBAN.—Next to the cobra, the snake-eating snake is said to be the most fatal serpent in India to human beings and cattle. It is a very fierce reptile, and always ready to fight. A man once stumbled on a nest of these creatures in India and immediately retired. But the mother snake gave him chase. The man fled; but though he ran as he never had done before, the

venomous beast gained steadily upon him. His hopes revived, however, when he saw a river in front. Into the stream he plunged, but only to find the snake on the opposite bank waiting for him. In despair, he dashed his turban into the reptile's face. The furious creature darted at it, and bit at it savagely for several moments, during which the man continued his headlong flight. He was, however, now safe, for the serpent returned quietly to its old den, seemingly satisfied with having made it very hot for the turban.

No. 78.

A CLEVER RUSE.—A traveller, drenched with rain and benumbed with cold, arrived at a country inn, which he found so full of people that he could not get near the fire. Addressing the landlord, he called out, 'Take a feed of oysters to my horse.' 'To your horse!' exclaimed the host; 'your horse will never eat them.' 'Do as I ask you,' replied the traveller. All the people, hearing the strange order given, and seeing the waiter about to execute it, rushed out immediately to the stable to see a horse eat oysters. The traveller, having now the whole room to himself, sat down comfortably by the fire and warmed himself at his ease. When the landlord returned, he said to the traveller, 'I would have wagered my head that your horse would not eat oysters.' 'Never mind,' replied the stranger, 'put them on the table, and when I am thoroughly dried I will eat them myself.'

No. 79.

ST. PATRICK AND THE SERPENT.—It is said that there are no serpents in Ireland, certainly no poisonous ones. St. Patrick, according to the legend, rid the Emerald Isle of all its vermin. There was one old serpent, however, that resisted the missionary for a time; but at last even it was banished by the cunning of St. Patrick. He invited the serpent to enter a box that he had made for it. The reptile declined on the plea that the box was much too small, but St. Patrick urged that it would find the box quite large enough to be comfortable. At length the serpent got into it, just to show it was right and St. Patrick was wrong. This, of course, was just what was wished for. He shut down the lid, fastened it, and threw the box into the sea. The Irish people seem to believe in the legend, for they will not allow snakes to live that have been introduced even for experiment, but kill them at once, in order that St. Patrick's great work may not be dishonoured.

No. 80.

A SNAKE IN A FIX.—A gentleman in India tells the following story:—'One night my wife and myself were awakened by a noise from the shelf which contained our stock of crockery, followed by a crash which showed that a great portion of our cups and plates had been flung to the floor. Springing up to discover the author of this attack on our china, I found a large snake, which had crawled upon the shelf, attracted by a number of eggs. One of these he had swallowed, and in order to get at the next he had put his head and a portion of his body through the handle of a jug which happened to stand between himself and the coveted delicacies. The handle was just large enough to let its body slip cleverly through, but not sufficient to let it pass when puffed out by the egg. In this position it had swallowed the second egg, and then found itself unable to advance or retreat, and in floundering about had caused the accident. I of course proceeded to execute summary justice upon it, but the eggs were a dead loss.'

—o—

MODEL ANSWERS TO THE ELEMENTARY PHYSIOGRAPHY QUESTIONS

SET AT THE MAY EXAMINATION OF THE SCIENCE AND ART DEPARTMENT, 1891.

BY R. A. GREGORY, F.R.A.S.

Honours Medallist in Physiography. Author of 'Physical and Astronomical Geography.'

SERIES I.

1. What chemical element is present both in air and water? State the chief properties of this elementary substance. What proportion of this element is contained in air and water respectively? In what condition does the element exist in air and water respectively?

(*a*) Oxygen.

(*b*) Oxygen has no colour, taste, or smell, and is an active supporter of combustion. Water dissolves about three per cent. of its volume of the gas at 15° C. Its specific gravity compared with air is 1·105. Under a pressure of 320 atmospheres and a temperature of —140°, oxygen is transformed to a sky-blue liquid.

(*c*) Air contains 23 per cent. of oxygen by weight and 20·8 per cent. by volume. Water contains 88·8 per cent. of oxygen by weight and 50 per cent. by volume. (The proportional composition of water may also be expressed by saying that 36 lbs. of water contains 32 lbs. of oxygen, and two pints of water contain one pint of oxygen, measured at the same temperature and pressure.)

(*d*) Oxygen exists uncombined in air, but in water it is chemically united to hydrogen—one atom of oxygen being joined to two atoms of hydrogen. ($H_2 + O = H_2O$.)

2. State the principle on which the action of a mercurial barometer depends. Why is a water barometer longer than a mercurial barometer? What occupies the space above the mercurial column in the latter instrument? If a hole were to be bored through the glass above the column of mercury what would happen?

(*a*) If two liquids, say mercury and water, are placed in the arms of a U-shaped tube, a short column of mercury will be found to balance a long column of water (Fig. 1). In like manner, the mercury introduced

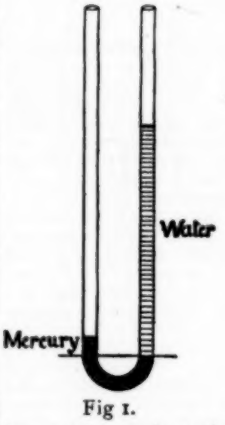


Fig 1.

into a tube, such as that illustrated by Fig. 2, balances a column of air extending upwards to the limits of the atmosphere. In an ordinary cistern barometer the pressure of the atmosphere on the surface of the mercury in the basin sustains the mercury in the tube; if the pressure decreases, the column shortens; if the pressure increases, the column stands higher.

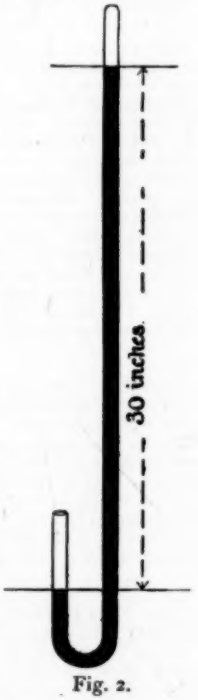


Fig. 2.

(*b*) A short column of mercury balances a long column of water, therefore mercury is heavier bulk for bulk than water, actually its specific gravity is 13·6. Hence a water barometer has to be 13·6 times longer than a mercurial one, because of this difference in specific gravity.

(*c*) The vapour of mercury.

(*d*) The mercury would fall down the tube to the level of that in the cistern.

3. What is the source of the water that falls as rain? What becomes of it when it reaches the ground? How do we indicate the quantity of rain which falls upon a given place during a year?

(*a*) The water on the earth. Clouds are formed of water which has evaporated from the earth, and rain is produced by the condensation of the water particles forming a cloud so as to form larger drops,

which fall to the ground through the action of the force of gravity.

(*b*) Part sinks into the ground to form springs, part flows off the land at once into rivers, and another part returns to the atmosphere again by evaporation.

(*c*) Rainfall is measured by means of a rain-gauge, and is expressed as the thickness in inches of the fall if it were spread evenly over the surface of the land where it occurred. The mean annual rainfall of any place is determined by measuring the yearly rainfall for several years and finding the average.

4. What is meant by a 'raised beach'? What do we learn from its existence? Name any place where raised beaches are found.

(*a*) A track of land or a sea-beach that has been raised above sea-level. The evidences of such upheaval are various. Sometimes a line of cliffs above sea-level is found covered with the remains of barnacles and other marine organisms. Or caves worn out of cliffs by the action of the sea are found at a certain distance inland, because of the elevation of the land. In some cases piers and harbours are rendered useless by being elevated above the high-water mark.

(*b*) That land is subject to slow movements of upheaval. Sea-worn caves can only be formed at sea-level, and marine shells do not naturally occur in any quantity above the level of high-water. When, therefore, these are found above the level of the waves, it is concluded that the land containing them has been elevated.

(*c*) The West Coast of South America, Spitzbergen, and many parts of the coast of England, *e.g.*, Sandwich and Winchelsea.

SERIES II.

5. How are the light and heat produced? (*a*) When a match is struck; (*b*) When a candle burns; (*c*) In a flash of lightning.

(*a*) An ordinary lucifer match contains phosphorus and potassium chlorate. These bodies will not combine with each other, or with the oxygen in the air, unless they are heated. In the case given, the chemical action which occurs is started by the heat produced by friction against a rough surface; afterwards, the heat given out as the above substances combine with each other is more than sufficient to carry on the combustion, of which light and heat is the result. Safety matches are tipped with a mixture of potassium chlorate and antimony sulphide, and the rubber on the box on which they may be struck is coated with a mixture of amorphous phosphorus and antimony sulphide. On striking the match some particles of phosphorus are brought into contact with particles of potassium chlorate, and the heat produced by their rubbing together starts the chemical changes, which cause inflammation.

(*b*) Combustion occurs whenever chemical action is accompanied by the development of light and heat. When a candle burns the carbon and hydrogen in the tallow or wax combine with the oxygen in the air to form carbon-dioxide and water, and heat and light are evolved so long as such chemical action, or burning, or combustion goes on.

(*c*) The air and the particles of dust in it are rendered incandescent by the passage of the electric spark. The colour of lightning depends upon the rarefaction of the air through which the discharge passes. In the lower regions of the atmosphere it is white, but in higher regions, where the air is less dense, the discharge may have a violet hue.

6. How would you set out a north and south line? (*a*) By the mariners' compass; (*b*) By the sun; (*c*) By a star.

(*a*) Draw a line in the direction of the north and south points of the compass. This line will indicate the magnetic and not the geographical meridian. To determine the true north and south, the magnetic variation at the place of observation must be found. At the present time the magnetic north at Greenwich is about 17° west of the true north.

(*b*) One method is to observe the shortest shadow of a fixed post on any day, and to draw a line in its direction. A better method is to mark the length and position of the shadow of a post some time before noon, and then to draw another line in the direction of the shadow having the same length after noon. The line bisecting the angle contained between these two lines points true north and south.

(*c*) By taking the direction of a telescope or a straight rod pointed to the pole star. But the pole star is $1\frac{1}{4}°$ distant from the celestial pole, and therefore it describes a circle, having a radius of $1\frac{1}{4}°$ round the true north point in the heavens. Hence, for an exact determination it is necessary to know in what part of the circle the pole star is at the time of observation.

7. What difference is observed in the place of the rising and setting of the sun (1) at different times of the year at any place in the British Isles? (2) at the summer solstices in different parts of the northern hemisphere?

(*a*) At the equinoxes (vernal and autumnal) the sun rises due east and sets due west all over the earth. When the arcs described by the sun in the heavens are increasing in size, that is, from winter to summer, our luminary rises and sets more and more north; as they decrease in size it is moving south. In London, at the summer solstice, the amplitude of the point on the horizon at which the sun rises is about 40° N. of E.; and the amplitude at sunset, 40° N. of W. At the winter solstice the amplitudes of rising and setting are 40° S. of E. and 40° S. of W. respectively.

(*b*) At the equator the sun rises due east and sets due west all the year round. In latitude 25° the amplitude of the sun at the solstices is about 26°; in latitude 50° its amplitude at the solstices is about $38\frac{1}{2}°$, the amplitudes increasing with the latitude.

8. State one experimental proof of the earth's rotation.

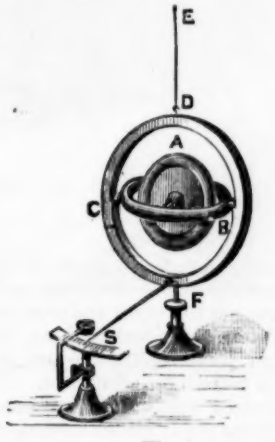


Fig. 3.

(An outline sketch of the gyroscope shown in Fig. 3. is sufficient with the following explanation.)

A is a heavy rimmed wheel in rapid rotation in the ring B, which is supported inside another ring, C, suspended

by a thread D E, and capable of turning on the point F. As the earth rotates the microscope and scale are carried round in the opposite direction to that of the hands of a watch, and therefore the end of the pointer S appears to move in the same direction as watch hands.

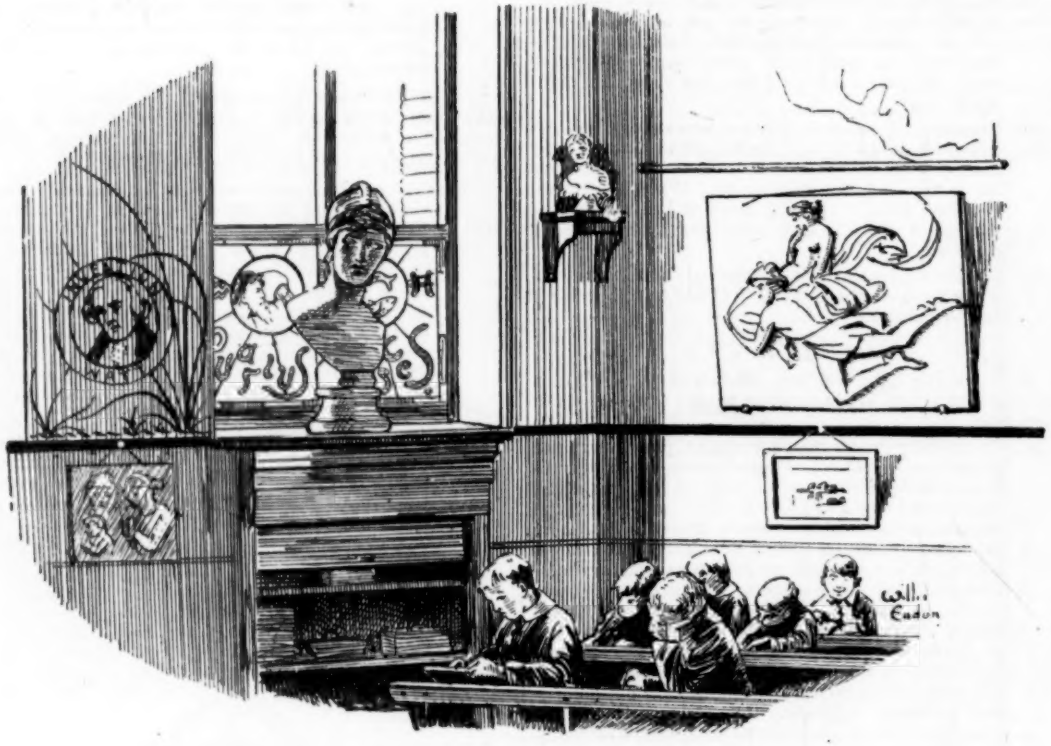
WELL-KNOWN TEACHERS AT WORK.

VIII.—MR. J. H. YOXALL.

Sharrow Lane Board School, Sheffield.

A LARGE amount of special interest must attach to the daily work and professional surroundings of the man who has won his way, with unexampled rapidity and at the age of 34, to the chief post of the N. U. T. Not only is Mr. Yoxall's name well known wherever teachers congregate, but the name and fame of his school are well known also. The Sharrow Lane Boys' Board School has a high local reputation, but it has also much more than a mere local reputation. Every year more than a hundred teachers, school-managers, and school-inspectors from other places visit it, and in the visitors' book are signatures of persons from Switzerland, Germany, Sweden, the United States, New Zealand, and other 'furrin parts.'

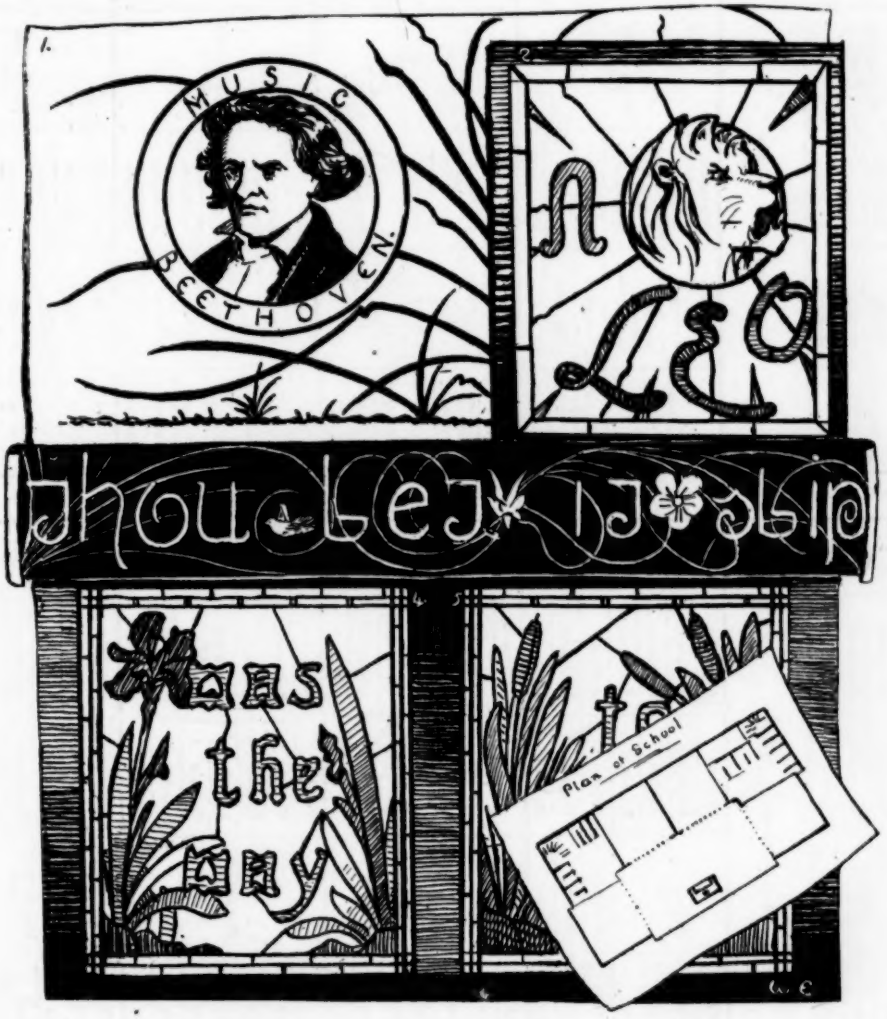
The Sharrow Lane Board School is, however, only five years old. It is large and exceptionally well-planned, and it is to a considerable extent recruited from what is called 'a good neighbourhood.' These favourable conditions have afforded to Mr. Yoxall certain opportunities to make his school distinguished, which he has quickly seized upon. But Bacon wrote that a certain order of minds 'create more opportunities than they find,' and if Mr. Yoxall found good opportunities in the circumstances of the school, he undoubtedly has *made* opportunities that could not merely have been found. The school is not only in the very foremost rank as regards the ordinary work of the best type of public elementary schools, and as regards local Scholarships and Exhibitions, football, athletics, etc., but it is a pioneer school in the discovery and use of new or amended methods of teaching, and in the introduction to school-life of the refining and educative influences of really good instrumental music and true art. Much of the 'school material' also is original; some of the school songs are of Mr. Yoxall's own writing: the spelling books and recitation books in use were edited by him; and when the upper standard boys laugh over 'Captain Cuttle' and sadden over 'Little Paul' it is through the special reading books which Mr. Yoxall has prepared for schools. In few schools is the organization so complete, the *esprit de corps* so developed, or the tone so good; and in very few are the relations between the master and his staff so fraternal and harmonious. Mr. Yoxall was writing from experience when he said, years ago,' Organization, no doubt, is half the battle; but half the battle of organization is the cultivation of good feeling between head and staff.'



A CORNER OF THE PRINCIPAL ROOM.

'In a school where that exists,' he wrote, 'there the work goes on smoothly, the workers toil happily, "results" come magically, without overtime, pressure, or strain.' To use the old theological phrases, a school where gruff, cold rule exists is 'under the law,' but a school of the other class is above the law and 'under grace.' No one more often or more readily acknowledges publicly the intense value of the happy loyal co-operation which he receives from his colleagues in school than Mr. Yoxall does, and, on the other hand, as a proof of this good feeling, we may quote the words of one of the staff, who said, 'In all the schools I have worked in, I have never felt so easy, comfortable, and free from worry. We are treated like *men*, thoroughly trusted, never spied upon, helped in every possible way, and consequently we try and repay this trust by honest, loyal work.'

Any person wishing to visit Sharrow Lane School, and arriving at either railway station in Sheffield, should first make his way to the head of 'Sheffield Moor' (which we found to be, not a stretch of heather, but a stretch of shops and pavement). From there tramcars run to Sharrow Lane by two routes. The exterior of the school is not architecturally beautiful, though its proportions are simple and massive. The Boys' Department, with which we are particularly concerned, is constructed on an admirable plan. The whole of the divisions of the school can be thrown into one, or resolved again into class-rooms by a simple and quick movement of the sliding glass-screens and glass-doors with which the building is fitted. From the master's chair, which is placed in what we may term the focus of the school, every part of it is readily visible. The rooms are all lofty, well-



'BITS' OF DECORATION.

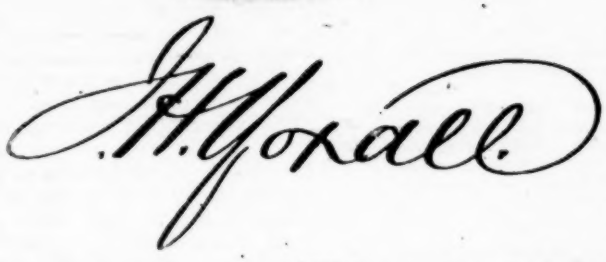
1. Fresco. 2. Painted Window. One of the Zodiac Series. 3. Frieze on brown paper. 4. and 5. Painted Windows.

SHEFFIELD SHARROW LANE BOARD SCHOOL (Boys') TIME TABLE, First Quarter, 1892.

	Morning								Afternoon							
Stands.	9 to 9.50	9.50 to 10.15	10.15 to 10.35	10.35 to 10.50	10.50 to 11.20	11.20 to 11.50	11.50 to 12	Days	2 to 2.30	2.30 to 2.50	2.50 to 3.15	3.15 to 3.25	3.25 to 3.50	3.50 to 4.20	4.20 to 4.30
I.	Registers, Worship, Scripture, Music	Reading	Writing	Play (or drill if wet)	Geography	Arithmetic	Dismissal	Monday	Registers and Reading	Writing	Arithmetic	Play (or drill if wet)	Geography	Singing	Dismissal
II.		Reading	Writing		Geography	Arithmetic				Writing	Arithmetic		Geography	Drawing	
III.		Reading	Writing		Geography	Arithmetic				Writing	Arithmetic		Geography	Drawing	
IV.		Reading	Writing		Geography	Arithmetic				Writing	Arithmetic		Geography	Singing	
V.		Reading	Manual Instruction, in drafts						Manual Instruction, in drafts				Geography	Drawing	
VI.		Reading											Geography	Drawing	
VII., etc.		Reading											Geography	Drawing	
I.	Registers, Worship, Scripture, Music	Reading	Writing	Play (or drill if wet)	English	Arithmetic	Dismissal	Tuesday	Registers and Reading	Writing	Arithmetic	Play (or drill if wet)	English	Drawing	Dismissal
II.		Reading	Writing		English	Arithmetic				Writing	Arithmetic		English	Singing	
III.		Reading	Writing		English	Arithmetic				Writing	Arithmetic		English	Singing	
IV.		Reading	Writing		English	Arithmetic				Writing	Arithmetic		English	Drawing	
V.		Reading	Mechanics	Mechanics	English	Arithmetic			Mechanics	Mechanics	Arithmetic		English	Drawing	
VI.		Reading	English	Writing	Mechanics	Mechanics			Mechanics	Mechanics	Arithmetic		English	Drawing	
VII., etc.		Reading	English	Writing	Mechanics	Mechanics			Mechanics	Mechanics	Arithmetic		English	Drawing	
I.	Registers, Worship, Scripture, Music	Reading	Writing	Play (or drill if wet)	Geography or Recitations	Arithmetic	Dismissal	Wednesday	Reading	Writing	Arithmetic	Play (or drill if wet)	Geography or Recitations	Singing	Dismissal
II.		Reading	Writing			Arithmetic			Reading	Writing	Arithmetic			Drawing	
III.		Reading	Writing			Arithmetic			Reading	Writing	Arithmetic			Drawing	
IV.		Reading	Writing			Arithmetic			Reading	Writing	Arithmetic			Drawing	
V.		Reading	Writing			Arithmetic			Reading	Manual Instruction, in drafts				Singing	
VI.		Reading	Writing			Arithmetic			Reading					Singing	
VII., etc.		Reading	Writing			Arithmetic			Reading					Singing	
I.	Registers, Worship, Scripture, Music	Reading	Writing	Play (or drill if wet)	English	Arithmetic	Dismissal	Thursday	Reading	Writing	Arithmetic	Play (or drill if wet)	English	Drawing	Dismissal
II.		Reading	Writing		English	Arithmetic			Reading	Writing	Arithmetic		English	Drawing	
III.		Reading	Writing		English	Arithmetic			Reading	Writing	Arithmetic		English	Singing	
IV.		Reading	Writing		English	Arithmetic			Reading	Writing	Arithmetic		English	Singing	
V.		Reading	Writing		English	Arithmetic			Reading	Writing	Arithmetic		English	Drawing	
VI		Reading	Writing		English	Arithmetic			Reading	Writing	Arithmetic		English	Drawing	
VII., etc.		Reading	Writing		English	Arithmetic			Reading	Writing	Arithmetic		English	Drawing	
I.	Registers, Worship, Scripture, Music	Reading	Writing	Play (or drill if wet)	Geography	Arithmetic	Dismissal	Friday	Reading	Writing	Arithmetic	Play (or drill if wet)	Geography	Drawing	Dismissal
II.		Reading	Writing		Geography	Arithmetic			Reading	Writing	Arithmetic		Geography	Drawing	
III.		Reading	Writing		Geography	Arithmetic			Reading	Writing	Arithmetic		Geography	Drawing	
IV.		Reading	Writing		Geography	Arithmetic			Reading	Writing	Arithmetic		Geography	Drawing	
V.		Reading	Writing		Geography	Arithmetic			Reading	Writing	Arithmetic		Geography	Singing	
VI.		Reading	Writing		Geography	Arithmetic			Reading	Writing	Arithmetic		Geography	Singing	
VII., etc.		Reading	Writing		Geography	Arithmetic			Reading	Writing	Arithmetic		Geography	Singing	

Registers closed 9.15 a.m., 2.15 p.m. Manual Instruction, and Musical and Military Drill, as per Special Time Tables. The First Four Afternoon Lessons strictly and entirely a revision of the Morning Lessons.

lit, and spacious; the class-rooms, each for sixty children, are twenty-five feet square. The principal room, upon which the others open, is ample in its proportions, without being too large for daily use in teaching. Each room can be filled and emptied independently of the others. The floor is rendered almost noiseless by a pavement of wooden blocks. The lobbies, cloak-rooms, lavatories, rooms for head and assistant teachers, store-room, etc., are on a generous scale, and in the most approved style of construction. Two exits lead into a convenient well-paved playground, which opens into two streets. In short, the school is justly considered one of the finest and most desirable of those belonging to the Sheffield School Board, and its list of applications for entrance is perpetually full.



The thing which strikes the visitor first when he enters the principal room is the lightness of the place. There are eight tall windows in the north wall, light enters also through the glass-screens in the other three sides of the room, and three large skylights open in the timbered roof. There is no need to arrange the desks for a left-hand light—though that is done—for a clear, white light is everywhere diffused, and 'Happy children to learn in such a place,' is what the visitor thinks to himself.

The next thing to strike the eye is the display of coloured glass in the school. Along the bottom row of panes in the west class-room runs a quotation form Tennyson's *Ode on the Death of the Duke of Wellington*:—

> Not once or twice in our rough island story,
> The path of duty was the path to glory.

This is quaintly lettered in a series of floral coloured designs upon the panes, and quite a church-window effect is obtained. Upon the sixteen lower panes of the windows in the chief room are painted the signs of the Zodiac and their names, together with heads emblematical of the four seasons, though these are not quite finished yet. All these are in colours delicate or brilliant, and fitted into imitation 'leads.' 'Yours must be quite an artistic Board,' says the visitor; and he is astonished to learn that all this ornamental glass is the handiwork of Mr. Yoxall and his chief assistant, Mr. Willis Eadon. The designs, which are entirely original, the lettering, and the more purely decorative work are due to Mr. Yoxall's taste and execution; whilst the tinting and the more purely artistic painting are done by Mr. Eadon in a style which has won for other work of his insertion in the *Daily Graphic* and in illustrated books.

Other evidences of taste and skill in art are visible. Upon eight wall spaces in the chief room are frescoed large medallion heads of Shakespeare, Raphael, Beethoven, Newton, Watt, Dickens, Matthew Arnold, and Wellington, typifying to the eyes of the scholars Poetry, Painting, Music, Science, Invention, Fiction, Education, and Duty. These have been painted on the walls in simple, but effective, lines and hues by Mr. Eadon. High up on the inner side of the room runs the quotation from Carlyle:—

> So here hath been dawning
> Another blue day;
> Think! will thou let it
> Slip useless away?

This was designed and lettered ornamentally by Mr. Yoxall, and the sole material used was glazed brown paper, red ink, and black ink. Along and above the dado of the walls are hung neatly-framed etchings, photogravures, sepia-drawings, stump-drawings, water-colours, oil-paintings, photographs, chromos, pieces of wood-carving and fret-work (done by scholars), medallions and panels in plaster, and a casting of Donatello's 'Saint Cecilia' in Sheffield steel. Vases stand on brackets, plaster busts and bronzes (after the sculptor of the *Mars* in the Louvre, Chantrey, etc.) stand in the broad window-sills, and a splendid large cast of Flaxman's noted bas-relief, 'Mercury conveying Hebe,' is fixed against an end wall. Higher on the walls hang the maps and diagrams, some of them of Mr. Yoxall's own making. The framed library catalogue, the rows of reference books for the teachers' use, the list of football successes, two honour records (supplied by the School Board) bearing the names of boys who have left school to enjoy scholarships won by them at the Sheffield Royal Grammar School, Technical School, and Wesley College, are prominent.

Looking through the glass partitions, you see in every room pictures neatly framed and other artistic objects, and the general impression from the whole is one of beauty, refinement, art, and pleasure. Surely the time will some day come when every school shall present the same impression; but in the meantime most of these beautiful things at Sharrow Lane are

Registers closed 9.15 a.m., 2.15 p.m. Manual Instruction, and Musical and Military Drill per Syllabus

bought out of the head-teacher's salary. A few of them are the result of a school concert and offerings by parents; and four of the etchings were kindly given by the etcher, Mr. E. Roe, whose sons attend the school.

Near the centre of the large room stands a good piano, with a capital music-chair, both wisely provided by the Board. The piano is almost as much a feature of the school as are the brush and palette. A member of the staff, Mr. H. B. Poole, is a musician of no mean powers, and daily musical performances, short but sweet, are an item in the time-table. The musical programme for the week hangs near each entrance, and the scholars as they pass in scan the programme for the annotated account of what is to be the day's bill of musical fare. Usually it is a pianoforte solo; sometimes a local violinist or vocalist, and sometimes one of the scholars or a choir of them, give the school 'a treat.' All the music is thoroughly good and classical, without being too abstruse. Nothing that is vulgar or commonplace is allowed to appear on the programme; and the children are being trained as much in good taste in music as they are in art. They listen, the youngest of them, with pleasure, and often with gusto; and although applause is seldom allowed, their appreciation and thanks are evident in their faces.

All this is found to help on the ordinary school-work in a large degree, and it develops a 'tone,' which serves instead of the painful martinet discipline which is too often considered 'the thing' in schools. Nothing is martinet-like at Sharrow Lane; the children move about the school from room to room, changing classes according to their different standards in different subjects without constraint, easily, naturally, and even joyously. 'Discipline without constraint' is what Mr. Yoxall has adopted for his motto—'discipline through *tone*.' 'Tone is the irradiation of the personality of the teachers on the scholars,' Mr. Yoxall once wrote. 'All day long we are teaching more than we wot of; and the result of our unconscious teaching is "tone."'

Signs of the original *modus operandi* in use in much of the work of the school are evident. The First and Second Standards write and sum all the year through on paper with lead-pencils; many of the maps are specially made or adapted for their work; on the floor, the yard, fathom, pole, etc., are marked side by side with the metre and decametre; and an effective comparison of the inch and square inch, yard and square yard, nine square feet and nine lineal feet, is painted on the floor. Within this diagram are marked the arrow and points of the compass. The plans of the school and the district are mounted in relief and framed. Right through the school everything is neatly framed or mounted; there are no 'loose ends,' and nothing that is not good and solid. The ordinary school museum finds no place here, even within the revolving shutters of the sunken cupboards; Mr. Yoxall has aimed rather to present a collection of objects representing art and art-processes. 'I have come to look with suspicion on too much apparatus,' said he, when the absence of a school museum was pointed out; 'the best apparatus and best means of illustration for a teacher is a piece of chalk.' But one distinctive feature of the school is its Time-table. 'Teachers who use the same Time-table year after year, or even throughout the year, do not know the advantage of a change,' he said. 'A change of Time-table three or four times a year enables the head-teacher to concentrate and re-adjust the teaching upon those subjects which from time to time are found to require most work.' The Time-table, of which a copy is here given, is one for the early part of the year; and its striking feature is the thorough and prompt revision and recapitulation of the morning's work which the afternoon's work affords. 'Hit the nail on the head, strike the iron whilst hot,' is the idea embodied in this Time-table. Under the New Code Mr. Yoxall has relaxed the system of fortnightly examinations which used to prevail in the school. A token (and a trophy) of the old percentage system, which Mr. Yoxall did so much by pen and voice to abolish, is seen in a 'Fortnightly Percentage Record,' which still hangs on the wall, though a brush full of ink has been dashed across it as a contemptuous farewell. It shows the way in which 98 and 99 per cent. used to be obtained under the Old Code. The last entry is for March, 1890, when the percentage for the school (for the fourth month) stood at 91.

Now, what of the man himself? Slightly above the medium height, well built, of very gentlemanly appearance, with hair slightly over forehead, and

pointed beard, he gives one the impression at first glance of a man of culture and artistic tastes, rather than of energy and activity. On entering into conversation with him, however, we at once feel that we are in the presence of a master-mind, able both to evolve, plan and carry out great ideas. That he is possessed of all these qualities, together with great energy, is plainly shown by his record during his last few years, both on the platform, and in the press.

He is President of the National Union of Teachers; he has written scholastic articles, school-books, leading articles, magazine articles, serial tales, short stories, and tales of adventure in almost countless number—all with acceptation and success. Though he has never striven for academic honours, his culture is comprehensive, and his acquaintance with 'men and things' is very wide. He enjoys the esteem of his townsmen and the trust and admiration of many thousands of his fellow-teachers. He has shown capabilities and done work which in any other walk of life would have led to riches and fame. That an educationist of this calibre is debarred from becoming an inspector or administrator under the Education Department is a reproach and a loss to the English Educational System. But perhaps wiser days and wider opportunities may come.

[Since the above was written Mr. Yoxall has accepted an unanimous and enthusiastic invitation to stand as Parliamentary candidate for the Bassetlaw division of Nottinghamshire. There are few teachers who will not be content to set 'party' aside and wish success to his candidature.]

PUPIL TEACHERS' COURSE.

1. A considerable number of Pupil Teachers who intend to sit upon the 30th instant at the Science and Art Department's Examination in Second Grade Geometry have been much exercised in mind by their Annual General Examination falling upon that day. They will be much relieved to find that Sir W. Hart-Dyke has stated to 'The House' that, to prevent this disabling coincidence, the latter examination will be held on an earlier date.

2. It has been officially announced in the '*Gazette*' that the Queen has been pleased to direct letters patent to be passed under the Great Seal of the United Kingdom creating her Majesty's Settlements in the Falkland Isles, and their dependencies, into '*The Colony of the Falkland Islands*,' and also constituting the office of Governor and Commander-in-Chief, and otherwise providing for the government thereof.

3. The census for New South Wales, just published, shows that the population of the Colony is 1,132,234, giving an increase since 1881 of 380,766. The population of Sydney is 383,386, an advance of 158,447 in the last ten years.

4. There is this month a great deal of matter in the Scholarship and Certificate Articles that may be profitably studied by Pupil Teachers of all years.

5. We publish no Routine this month, so that time may be given to the April examined Pupil Teachers to revise. The present month is also a convenient half-way house for the October teachers to pause in, and work up arrears and weak subjects.

6. *A few faults in answering:—*

(*a*) The *form* of the answer is unconsidered. Some questions lend themselves more than others to tabular, rather than to literary, treatment, and *vice versâ*. This is especially the case in History and Geography.

(*b*) Not enough use is made of the scribbling paper in preparing outlines of questions. Many essays are written without any plan at all.

(*c*) Diagrams and sketch maps are not often enough introduced. If the question give the slightest excuse, drawing should be utilised as well as verbal description. All sketches should be placed as far as possible to the North-East—left-hand top—of the answer.

(*d*) A series of questions are not symmetrically answered. Too much time is devoted to one subject, or portion of a subject, whilst important parts are left out in the cold.

(*e*) The Music is not attempted, although the marks for this subject are more easily secured than for any other. It must be remembered that in calculating the percentage of marks on the whole examination, the marks devoted to Music are reckoned in the actual number that might have been attained, whether the Pupil Teacher answered any question or not.

(*f*) The questions on Theory are too frequently neglected, and are seldom answered both concisely and exhaustively.

(*g*) The literary merit of the answers is often small, on account of neglect of synonyms caused by a meagre vocabulary, and the oscillation from lists to descriptive sentences and back again. Mere phrases without any finite verb are often employed, and punctuation is frequently neglected.

(*h*) Definitions are *generally* defective. Many pupils do not understand that a perfect definition is a beautiful triumph both of science and art; that there is nothing in excess or defect, and that not a single word can be dispensed with or introduced without serious damage to the whole logical fabric.

Popular, superficial, and even incorrect notions are in the pupil's mind, and from these, assisted by his inner consciousness, he frames his own definitions, to be the admiration (?) of gods, men, and examiners.

(*i*) *Utter carelessness* is often manifested even in the Scholarship and Certificate Examination. Errors in spelling are not infrequent; the apostrophe is often omitted, and in the plural possessive frequently misplaced; the directions upon the examination paper are disregarded; the meaning of a plain question repeatedly overlooked; and the whole compass of errors boxed. Truly great is the strength of inertia.

(*j*) A few *clever*, yea, in this case too clever candidates attempt to be '*smart*' and witty, and a very few wax impertinent.

There have been cases where really great ingenuity has been thus expended in order that the candidate may imperil his own chances, and in not a few instances he has succeeded.

(*k*) Attempts are made to impose upon the Examiner by writing round a question, inserting unrequested facts and other extraneous matter. This course of proceeding never results in anything but negative gain. The Examiner soon recognises where '*the padding comes in*,' and shows by paucity of marks his disgust.

Here is a specimen:—

Question—Describe the productions of Hindostan?

Answer—'The productions of Hindostan are numerous and varied, and many of them are of extreme service to considerable numbers of mankind. The Government of India, which in the warm season is carried on at Simla (for the climate would otherwise exercise upon it a deleterious influence), raises from taxes upon the native productions a considerable amount of its revenue. It may be mentioned that opium is grown, together with many other things too numerous to mention, etc., etc. (*N.B.* I had no time to further particularise.)'

This answer is in no way a caricature; indeed, it is better than many sent in, for the language is more polished. How many marks would it obtain?

(*l*) Answers, correct as far as they go, are often too indefinite; *e.g.*, South Shields is said to be on the eastern coast of England—in Durham—on the Tyne, etc., instead of being described as in the extreme north-east of Durham, at the mouth of, and on the south bank of the Tyne. By stating that a needle is in a bundle of hay, its location is not very exactly defined.

(*m*) *Revision of answers is many times completely neglected.* Even if one question less be answered, don't omit looking over the replies already given.

A FEW SUITABLE QUESTIONS.

First Year.

1. *Boys.*—A's share is ·6̇9̇ of B's; B's is 3·08 of C's; C's is 1·1 of D's. C's share is £2,750. Find A's, B's, and D's.

Ans. £770, £8,470, £2,500.

Girls.—Make out the following bill, showing how the working may be abbreviated—

			£	s.	d.	
17½	lbs.	of mutton at	0	0	9½	per lb.
5½	"	" "	0	0	11	"
13	"	beef "	0	0	10¾	"
7	"	" "	0	0	11½	"
19	"	bacon "	3	7	8	per cwt.

Ans. £2 8s. 6d.

2. What are the different contrivances by means of which the addition of 'Long Tots' can be facilitated?

3. Write in Large hand a copy of the word '*Idiosyncrasy.*'

Write in Small hand a copy of the line, '*Far from the madding crowd's ignoble strife.*'

4. Analyse the following passage, and parse the italicised words—

'To *humbler* functions, awful *Power!*
I call *thee:* I *myself commend*
Unto *thy* guidance from *this* hour;
Oh, let my weakness *have* an end!
Give unto me, *made* lowly, *wise*,
The *spirit* of self-sacrifice;
The confidence of Reason give;
And in the light of truth thy *Bondman* let *me* live.'

5. Write an essay upon the Canadian Pacific Railway.

6. Give Teutonic suffixes denoting *skill, quality, race, firm, devoid of, direction.* Make other verbs from *grip, pat, hear, clean.*

7. Where and what are *Torres, Flinders, Paramatta, Torrens, Mackenzie, Boothia, Three Rivers?*

8. Explain the formation of deltas. Why do not all rivers have deltas?

9. Draw a map of England south of the Thames.

10. Give particulars as to the location of the different races inhabiting England in 1065.

11. Enumerate, *with dates*, six of the chief battles between B.C. 51 and A.D. 1065.

12. Decline *lingua*, OR, write down the different French forms for *the, at the*, or *to the, of the.*

13. Write down all the Simple Times (in Music) that you know, OR, all the Simple Measures.

14. What are the advantages and disadvantages of simultaneous reading?

Second Year.

1. *Boys.*—Divide ten guineas between A and B so that ⅓ of A's portion shall equal ¼ of B's. Ans. £6, £4.

Girls.—A man who has lost $\frac{1}{3} \times \frac{\frac{1}{3}}{\frac{1}{3} - \frac{1}{10}}$ of his capital has £3,500 remaining. What sum did he lose? Ans. £7,000.

2. Prove that if the numerator and denominator of a fraction are both divided or multiplied by the same number that the value of the fraction remains unaltered.

3. Writing as in First Year.

4. Describe the different Lake Districts of Europe.

5. Where and what are *Andaman, Comorin, Vindhya, Tapti, Benares*, and *Gilgbit?*

6. Explain the phenomenon of gaining or losing a day in circumnavigation.

7. Draw a map of Portugal.

8. Paraphrase the following:—

'*I* loving *freedom*, and *untried*
No *sport* of every random gust,
Yet being to myself a *guide*,
Too blindly *have reposed* my trust:
And *oft*, when in my heart *was heard*
Thy *timely* mandate, I deferred
The *task* in smoother walks *to stray;*
But thee I now *would serve* more strictly, if I *may.*'

9. Analyse the above passage and parse the italicised words.

10. Give three different forms of *ad-, con-, dis-*, and *ex-* respectively.

11. What measures did William the First take to complete and consolidate his conquest?

12. How did the English population gradually reassert and emancipate itself after the Conqueror's death?

13. *Boys.*—Write out Euclid I. 26.

If two triangles have two sides of the one equal to two sides of the other, each to each, and have likewise the angles opposite to one of the equal sides in each equal, and have also the angles, opposite to the other equal sides in each, of the same kind (viz., both acute, rightangled, or obtuse), then the triangles are equal in every respect.

Girls.—Describe the stitches required in the Needlework of Standards VI. and VII.

14. Write out the Compound Tenses of '*aimer,*' OR, decline three typical Latin Nouns of the Third Declension.

15. What are the signatures of the Major Scales of A, E♭, and E? OR, describe the mental effects of each note of the scale.

Third Year.

1. *Boys.*—What is meant by the reciprocal of a number? What fraction divided by its reciprocal gives a quotient $\frac{15}{176}$? Ans. $\frac{3}{4}$.

Girls.—Question 1 of Boys' Second Year.

2. *Boys.*—Define *Stock, Premium, Par, Discount, Consols, Brokerage.*

Girls.—Explain how you would add together, without reducing to Vulgars, three decimals with two, three, and four repeaters in each respectively.

3. Writing as in First Year.

4. Paraphrase the following:—

'*Who* is he
That every man in arms should *wish to be?*
It is the generous *Spirit*, who *when brought*
Among the tasks of real life, hath wrought
Upon the plan that *pleased his* boyish thought;
Whose high endeavours are an inward *light*
That makes the path before him always *bright:*
Who, with a natural instinct *to discern*
What knowledge can *perform*, is *diligent to learn.*

5. Analyse the foregoing passage, and parse the words in italics.

6. Classify, with examples, Irregular Verbs.

7. Draw a map of the River System of India, showing the boundaries of the principal River Basins.

8. Describe fully the origin and course of the Great Equatorial Current.

9. Where and what are Sir Daria, Tobolsk, Dhawlagiri, Khyber, Baikal, Limpopo, Timbuctoo, Great Karoo, and Fez?

10. Describe the proceedings of the Convention Parliament.

11. Give the principal provisions of the 'Bill of Rights.'

12. Write notes of a First Lesson on Division of Algebra, OR, on *Coal.*

13. Conjugate the Verb *Joindre*, OR the Verb *Eo, ivi, itum, ire.*

14. *Boys.*—Write out from memory Euclid I. 34. Prove that the diagonals of a parallelogram bisect each other.

Girls.—What are the most commonly recurring faults in hedge-tear darning?

15. *Boys.*—
$$\left.\begin{aligned} \frac{2x+5}{6\frac{1}{2}} + \frac{3y}{4\frac{1}{2}} &= 4 \\ \frac{x+5}{4\frac{1}{2}} + \frac{4y+1}{6\frac{1}{2}} &= 4 \end{aligned}\right\} \text{Ans. } x=4, y=3.$$

Girls.—Give recipes for sago pudding, and directions for making coffee.

16. *Boys.*—The sides of a triangle are in the proportion of the numbers 3, 4, 5, and the area is 726 sq. feet. Find the sides in feet. Ans. 33, 44, 55 ft.

Girls.—Describe bread-making.

17. What is the meaning of *Dolce, Ralentando, Allegro, Andante, Forte, Piano?*

(*N.B. For Fourth Year Questions see Scholarship Article.*)

(*For Answers to Correspondents see end of Certificate Article.*)

LA JEUNE SIBÉRIENNE.

TRANSLATED BY PROFESSOR DARQUÉ—*(Author of 'Pupil Teachers' French Course.')*

La Jeune Sibérienne.

Elle envoya chercher[278] son amie, Mme. G°°°, aussi bonne et aussi charitable qu'elle, pour lui recommander la jeune voyageuse, et pour aviser ensemble aux moyens de lui être utile. Après le déjeuner, et lorsque Prascovie se fut un peu familiarisée avec ses nouvelles protectrices, elle leur raconta dans le plus grand détail l'histoire malheureuse de ses parents, et ne leur cacha pas le projet extraordinaire qu'elle avait formé d'aller à Saint-Pétersbourg demander la grâce de son père.

Mme. Milin, sans trop croire au succès de son entreprise, ne l'en détourna pas[279]; mais les deux dames résolurent de la retenir jusqu'au printemps. Le froid était devenu excessif. La voyageuse elle-même voyait l'impossibilité de continuer sa route pendant la rigueur de la saison; et les dames, qui voulaient la garder, ne lui parlèrent point encore de ce qu'elles avaient le pouvoir de faire, et de ce qu'elles firent en effet, plus tard, pour l'aider dans son entreprise.

Prascovie se trouvait bien heureuse chez elles.[280] Les caresses et la noble familiarité de ces personnes distinguées avaient un charme tout nouveau pour elle; aussi le souvenir du temps fortuné qu'elle passa dans leur société ne sortait point de sa pensée.[281] Lorsque dans la suite elle racontait cette partie de son histoire, le nom chéri de Mme. Milin amenait toujours dans ses yeux des larmes de reconnaissance.

Cependant sa santé se trouvait fort ébranlée: la nuit désastreuse qu'elle avait passée dans la forêt lui avait laissé un rhume violent que les grands froids n'avaient fait qu'augmenter.[282] Elle profita de son séjour à Ekatherinembourg pour se soigner,[283] et surtout pour apprendre à lire et à écrire. Cette circonstance de sa vie donnerait une bien mauvaise idée de ses parents, pour avoir négligé jusqu'à ce point l'éducation de leur unique enfant, si la pensée d'un exil éternel ne leur avait peut-être fait envisager comme inutile, ou même dangereuse, toute instruction pour leur fille, destinée en apparence à vivre dans les dernières classes[284] de la société. Cette profonde ignorance et l'abandon total dans lequel elle avait vécu jusqu'alors, rendent plus extraordinaire encore l'essor généreux de son âme. Quoi qu'il en soit, Prascovie, occupée en Sibérie des travaux domestiques, avait absolument oublié le peu de lecture qu'elle avait appris dans sa première enfance. Elle se mit à l'étude avec toute l'ardeur et la force de son caractère, et fut, en quelques mois, en état

The Young Siberian.

She sent for her friend, Mrs. G., *who was* as kind and charitable as herself, in order to recommend the young traveller to her, and to devise together the means of being useful to her. After breakfast, and when Prascovie had become somewhat familiar with her new protectresses, she related to them in every particular the unfortunate history of her parents, and did not hide from them the extraordinary project which she had formed of going to St. Petersburg to ask a free pardon for her father.

Mrs. Milin, without putting too much faith on the success of her undertaking, did not dissuade her from it; but both ladies resolved to detain her till the spring. The cold had become excessive. The traveller herself saw the impossibility of proceeding on her journey during the severity of the season; and the ladies, who wanted to keep her, did not speak to her yet of what it was in their power to do, and what they in fact did, later on, to help her in her undertaking.

Prascovie felt very happy with them. The caresses and noble familiarity of those eminent persons had a charm quite new to her; therefore, the recollection of the happy time which she passed in their company was ever present in her mind. When later she related that part of her history, the beloved name of Mrs. Milin always brought tears of gratitude into her eyes.

Meanwhile her health was greatly shaken: the disastrous night she had passed in the forest had given her a very bad cold, which the severe winter had only increased. She availed herself of her stay in Ekatherinemburg to attend to her health, and especially to learn to read and write. This circumstance of her life would give one a very poor opinion of her parents, for having neglected so much the education of their only child, if the thought of an eternal exile had not perhaps made them consider as useless, or even dangerous, any learning for their daughter, *who was* apparently destined to live among the lower classes of society. This gross ignorance and the total abandonment in which she had lived until then, render the generous flight of her soul still more extraordinary. At any rate, Prascovie, *having been* employed in Siberia at domestic work, had entirely forgotten the little *knowledge of* reading she had acquired in her early infancy. She set to work with all the eagerness and strength of her character, and was in a

Notes.

(278) *Envoya chercher*, literally 'sent (someone) to fetch.'

(279) *Détourner*, to turn away, to deter.

(280) *Chez elles.* *Chez* does not always allude to the house: *c'était la coutume chez les Romains*, it was the custom among the Romans.

(281) *Ne sortait point de sa pensée*, literally 'did not go out of her thought.'

(282) *N'avaient fait qu'augmenter.* *Ne faire que* followed by an infinitive does not always mean 'to do continually' the thing expressed by the infinitive.

(283) *Se soigner*, literally 'to take care of herself.'

(284) *Les dernières classes.* We now say *la basse classe*, but under the Bourbon kings the former expression included also what we now call the lower middle class.

de comprendre un livre de prières que lui avaient donné ses protectrices : on était souvent obligé de l'arracher de cette occupation.[285] Le plaisir qu'elle éprouvait, en trouvant dans ces prières les sentiments naturels de son cœur développés et exprimés d'une manière si claire et si touchante, lui faisait désirer vivement l'instruction. 'Combien les gens du monde sont heureux ! disait-elle ; comme ils doivent prier Dieu de bon cœur, étant si bien instruits de leur religion, avec tant de moyens d'exprimer leur dévotion, et tant de sujets de reconnaissance envers la Providence pour les faveurs dont elle les a comblés !'

Mme. Milin souriait à ces réflexions de la jeune fille ; mais elle pensait que rien ne devait être impossible à une piété si vraie,[286] à des prières si ardentes.[287] Cette pensée persuada, plus que toute autre chose, les deux charitables dames qu'il fallait la favoriser dans ses projets et l'abandonner à la Providence, qui semblait la protéger si visiblement. Mme. Milin et son amie n'avaient rien négligé, jusqu'alors, pour la dissuader, et lui avaient fait les offres les plus obligeantes, les plus avantageuses, pour la retenir auprès d'elles ; mais rien n'avait pu l'ébranler. Elle se reprochait même le bien-être et le bonheur dont elle jouissait à Ekatherinembourg. 'Que fait mon père maintenant, tout seul dans le désert, tandis que sa fille s'oublie ici au milieu de toutes les douceurs de la vie ?' Telle était la question que ne cessait de s'adresser Prascovie. Ces dames se décidèrent donc à lui donner les moyens de continuer sa route. Au retour du printemps, Mme. Milin, après avoir pourvu à tout ce dont elle pouvait avoir besoin, arrêta[288] pour elle une place sur un bateau de transport[289] ; elle la mit sous la garde d'un homme qui se rendait à Nijeni[290] pour des affaires de commerce, et qui était habitué à ce voyage difficile.

Avant de passer les monts Ourals,[291] qui séparent Ekatherinembourg de Nijeni, on s'embarque sur les rivières qui sortent de ces mêmes[292] montagnes et qui se portent vers le nord. On voyage par eau jusque dans le Tobol,[293] que l'on quitte ensuite pour s'approcher des montagnes.

Le passage n'est ni bien haut ni très-difficile. Lorsqu'on l'a franchi, l'on s'embarque de nouveau sur les eaux qui descendent dans le Volga.[294] Prascovie, n'ayant pas les moyens de se procurer une voiture et de voyager en poste, profita d'une des nombreuses embarcations qui portent en Russie le fer et le sel par la Tchousova et la Khama.[295]

Son conducteur lui épargna tous les embarras de ce long voyage, qu'elle n'aurait pu faire seule sans courir de grands dangers ; mais son malheur voulut que[296] cet homme tombât malade en traversant les défilés et fût contraint de s'arrêter dans un petit village sur les

few months, able to understand a prayer-book which her protectresses had given her : they were often obliged to make her leave off. The pleasure she felt, on finding in those prayers the natural sentiments of her heart developed and expressed in so clear and pathetic a manner, made her yearn for instruction. 'How happy the well-to-do are ! she would say ; how heartily they must pray to God, having been taught their religion so well, and having so many means to express their piety, and so many grounds of gratitude to Providence for the favours He has lavished upon them !'

Mrs. Milin smiled at those reflections of the young girl ; but she thought that nothing could be impossible to so true a piety, to such earnest prayers. That thought, more than anything else, convinced the two charitable ladies that they should encourage her in her projects and leave her to *the care of* Providence, who seemed to protect her so visibly. Mrs. Milin and her friend had neglected nothing, until then, in order to dissuade her, and had made her the most obliging and advantageous offers in order to keep her near them ; but nothing had been able to shake her resolution. She was reproaching herself even the comforts and happiness she was enjoying at Ekatherinemburg. 'What is my father doing now, all alone in the desert, while his daughter is forgetting herself here in the midst of all the sweets of life ?' Such was the question which Prascovie asked herself continually. Those ladies resolved, therefore, to supply her with the means to proceed on her journey. On the return of spring, Mrs. Milin, after having provided her with everything that she might want, booked a place for her on a boat ; she placed her under the care of a man who was going to Nijeni on business, and who was accustomed to that difficult journey.

Before crossing the Ural mountains which separate Ekatherinemburg from Nijeni, people embark on the rivers that rise in those very mountains and flow northwards. People travel by water as far as the Tobol, which they leave afterwards to draw near the mountains.

The pass is neither very high nor very difficult. When one has got through it, one embarks again on the rivers which flow into the Volga. Prascovie, not having the means to hire a carriage and travel with post-horses, availed herself of one of those boats which bring into Russia iron and salt down the Tchousova and Khama.

Her conductor saved her all the trouble of that long journey, which she could not have made alone without running great dangers ; but unfortunately that man was taken ill while crossing the narrow passes and was compelled to stay in a small village on

(285) *Arracher* literally means 'to eradicate' ; hence the figurative meanings 'to tear,' 'to snatch,' etc.

(286) *Tout* is the only French adjective that precedes the articles : *toute une semaine*, a whole week ; *toute la journée*, the whole day. We must, therefore, say *une si jolie fleur*, so pretty a flower ; *une pitié si vraie*, so true a pity.

(287) *Des prières si ardentes*. If *prières* had been in the singular we might have said, 'so earnest a prayer.' Notice further that when 'such' immediately precedes the noun, it is rendered by *tel, telle*, etc. ; whereas, if an adjective intervene, it is by *si* that it must be translated : *un tel homme*, such a man ; *un si brave homme*, such a good man.

(288) *Arrêter*. Notice the expressions : *arrêter un voleur*, to stop a thief ; *arrêter un domestique*, to engage a servant.

(289) *Bateau de transport*, a boat intended to carry chiefly goods.

(290) *Nijeni-Novogorod*, an important town built at the confluence of the Volga and Oka, and renowned for its great annual fairs.

(291) *Les monts Ourals*. These mountains lie between Europe and Asia, and run almost due north and south.

(292) When *même* precedes a noun it is generally rendered by 'same' ; whereas, if it follows it, 'very' is its more usual English equivalent. Do not mistake the adverb *même*, even, for the adjective.

(293) *Tobol*, a river of Siberia which falls into the Irtish at Tobolsk.

(294) *Volga*, the largest river of Europe ; it falls into the Caspian Sea at Astrakhan.

(295) *Tchousova* and *Khama*, two tributaries of the Volga.

(296) *Son malheur voulut que*, literally 'her ill-luck would have that.'

bords de la Khama : elle fut donc encore livrée à elle-même et privée de tout appui. Elle fit heureusement le trajet jusqu'à l'embouchure de la Khama dans le Volga. Depuis ce lieu, le bateau, remontant le fleuve,[297] était tiré par des chevaux. La voyageuse éprouva dans ce dernier trajet un accident qui lui fit courir les plus grands dangers. Pendant un de ces violents orages qui sont très-fréquents dans ces contrées, les bateliers, voulant éloigner la barque du rivage,[298] poussèrent avec force une grande rame, qui servait de gouvernail, du côté[299] où plusieurs personnes étaient assises sur le bord du bateau, et n'eurent plus le temps de[300] la retirer : trois passagers, au nombre desquels était Prascovie, furent renversés dans le fleuve. On les retira aussitôt, et la jeune fille ne fut point blessée ; mais la honte qu'elle éprouvait de changer de vêtement devant tout le monde fit qu'elle les laissa sécher sur elle : un violent rhume fut la suite de cet accident, qui eut une influence malheureuse sur sa santé.

the banks of the Khama : she was, therefore, left again to herself and deprived of that protection. She made safely the journey as far as the confluence of the Khama and Volga. From that place, the boat ascending the river, was drawn by horses. The traveller met during this last passage with an accident which made her run the greatest dangers. During one of those violent thunderstorms which are very frequent in those countries, the boatmen, wishing to get the boat away from the bank, pushed with force a large oar, which answered the purpose of rudder, towards the place where several persons were seated near the edge of the boat, and were unable to withdraw it in time : three passengers, among whom was Prascovie, were thrown into the river. They were immediately rescued, and the young girl was not hurt ; but the shame she felt at *the thought* of changing her clothes in presence of everybody was the cause she let them dry upon her : a fearful cold was the consequence of that accident, which had unfortunate consequences for her health.

(297) *Un fleuve* is a river that keeps its name till it falls into the sea, whereas *une rivière* loses it when it falls into another river.

(298) *Rivage* is now generally said of the sea only, whilst *rive* is preferred in reference to rivers.

(299) *Du côté où*, in the direction (of the place) where.

(300) *N'eurent plus le temps de la retirer* were perhaps better translated by 'could not stop it soon enough.'

Les dames d'Ekatherinembourg, qui avaient chargé son conducteur de faire les arrangements nécessaires pour la continuation de son voyage depuis Nijeni, ne l'avaient recommandée à personne dans cette ville, où Prascovie n'avait pas l'intention de s'arrêter : elle se trouva donc, à son arrivée, sans connaissances et sans protection. Les bateliers la déposèrent sur le bord du fleuve avec son petit équipage, qui était devenu plus volumineux par les soins de Mme. Milin.

The ladies of Ekatherinemburg, who had charged her conductor with making the necessary arrangements for the continuation of her journey from Nijeni, had not recommended her to anyone in that town, where Prascovie did not intend to stop ; she was, therefore, on her arrival, without acquaintances and without protection. The boatmen put her down on the bank of the river *together* with her little luggage, which had become more bulky through Mrs. Milin's kindness.

En face du pont où l'on débarque ordinairement sur le rivage du Volga, se trouvent une église et un couvent de religieuses, situés sur une éminence. Elle s'y achemina pour faire ses prières accoutumées, se proposant d'aller ensuite chercher un gîte quelque part dans la ville.

Opposite the bridge where people generally land on the bank of the Volga, are a church and a convent of nuns, situated on a rising ground. She directed her steps towards it to say her usual prayers, with the intention of going afterwards to seek a lodging somewhere in the town.

En entrant dans l'église, qui lui parut déserte, elle entendit, au travers de la grille, les chants des religieuses qui achevaient leurs prières du soir, et regarda cette circonstance comme de bon augure. 'Un jour, se disait-elle, si Dieu favorise mes vœux, je serai de même cachée sous le voile, n'ayant plus d'autre occupation que celle de remercier la Providence de ses faveurs.'

On entering the church, which appeared to her deserted, she heard through the grating, the singing of the nuns who were finishing their evening prayers, and looked on that circumstance as a good omen. 'Some day, she said to herself, if God hears my wishes, I shall likewise be hid under the veil, having no longer any other occupation but that of thanking the Almighty for His mercies.'

Lorsqu'elle sortit de l'église, le soleil se couchait : elle s'arrêta quelque temps sous la porte, frappée de la belle vue qui se présentait à ses regards. La ville de Nijeni-Novogorod, située au confluent de deux grands fleuves, l'Oca[301] et le Volga, offre, du point où elle se trouvait, un des plus beaux sites que l'on puisse contempler : son étendue lui paraissait immense et lui inspirait une espèce de crainte.

When she went out of the church, the sun was setting : she stopped a little while under the door, struck with the beautiful view that presented itself to her eyes. The town of Nijeni-Novogorod, situated at the confluence of the two great rivers, the Oca and the Volga, offers, from the point where she was, one of the most beautiful sites that one can contemplate : its extent appeared to her immense and struck her with awe.

(301) *Oca*, also written Occa and Oka, a large river which falls into the Volga at Nijeni-Novogorod.

(To be continued.)

THE 1892 SCHOLARSHIP EXAMINATION.

BY DR. GEORGE BEACH, M.A.,

Co-Author of 'A Manual of our Mother Tongue,' 'A Girl's Arithmetic,' Author of 'Elements of English,' 'Entertaining Readers,' etc.

MOST COMMON FAULTS IN 'SEWING,' ETC.

(Continued from page 503.)

N.B.—The faults already spoken of as occurring in the lower standards will not be again mentioned in connection with the upper ones.

(1) STANDARD V.—*Wide Hem.*—Not preserving exact width through lack of measuring; Preliminary folding too deep.

Tucking.—Line of thread not adhered to; Distance between tucks unequal; Running on upper side instead of under side of tuck; Backstitches introduced.

Calico Patch.—Hole not cut until after completion of patch; Patch not set square with material; Directions of threads of materials not coincident; Corners badly worked; Seaming irregular; Cutting-out of under-piece uneven; Inner corners not carefully slit; Turning in fell careless.

Knitting.—Beyond the elementary faults mentioned in previous standards, those generally perpetrated in Standard V. are due to ignorance of, or inattention to the particular details of construction. Hence arise multitudinous varieties of misfits.

Paper Pattern of Child's Pinafore.—Errors in details of proportion and size; Any Freehand work such as neckslope or armholes defective in curves; Tacking-together too heavy for paper, causing tearing.

Marking on Canvas.—Under side untidy; Stitches loose on right side; Fastening on and off defective.

Plain Darning a hole in stocking material.—Hole left untidy at commencement; Not darning sufficient around the hole; Loops omitted; Edges of hole not smoothly darned in, but showing on right side; Yarn and stocking materials of different degrees of fineness; or even different materials altogether.

(*To be concluded next month.*)

(2) Our Readers, whether Pupil-Teachers, Ex-Pupil-Teachers, or External Candidates, who are desirous of sitting at the next Scholarship Examination in July, must obtain permission from the Education Department before the 1st of May. There is therefore no time to be lost. Although they may have enrolled themselves on a Training College List of Candidates, this is not sufficient; the specific official consent must nevertheless be obtained. The School Correspondent (where possible), should address

The Secretary,
Education Department,
Whitehall,
London, S.W.

(3) NOTES ON EUCLID—*Continued.*

Signs and contractions.

(*a*) ALLOWED BY DEPARTMENT.

=	means	*equal to*, or *equals*
>	„	*angle*
rt. >	„	*right angle*
∠ABC	„	*angle ABC*
	„	*angle ABC*
⊥	„	*perpendicular*
Δ	„	*triangle*
rt. >d. Δ	„	*right-angled triangle*
Equil. Δ	„	*equilateral triangle*
Isos. Δ	„	*isosceles triangle*
str.	„	*straight*
∥	„	*parallel*, or, *parallel to*
	„	*parallelogram*
sq.	„	*square*
rect.	„	*rectangle*
⊙	„	*circle*
circu. of ⊙	„	*circumference of circle*
∴	„	*therefore*
∵	„	*because*

(*b*) NOT ALLOWED BY DEPARTMENT.

7	means	*greater than*
⌐	„	*less than*
	„	*not greater than*
	„	*not less than*
AB^2	„	*sq. on AB*
AB.BC	„	*rect. contained by AB and AC*
AB + BC	„	*sum of AB and BC*
AB — BC	„	*difference of AB and BC*
AB × BC	„	*product of AB and BC*
AB ÷ BC	„	*quotient of AB divided by BC*
$\frac{AB}{BC}$	„	*quotient of AB divided by BC*

The RULE is that ANY *descriptive* abbreviations of TERMS may be used, but not *ambiguous* ones (*e.g.*, ∠ = *less than*), nor may signs of arithmetical OPERATIONS be employed.

Neither figures, manuscript capitals, nor the leading letters of the alphabet may be applied to the diagrams, but such characters as M, N, O, P, Q, R, etc.

Converse of Propositions.—There is no converse to Problems, but every Theorem has at least *one* converse, and sometimes *many*. When the whole or a part of the conclusion of *Proposition A* forms the hypothesis of a kindred Proposition B, whilst the whole or a part of the hypothesis of *A* forms the conclusion of B, then A and B are converse propositions.

Proposition A (*Euclid* I. 5).—

The Hypothesis is 'Two sides of a triangle are equal.'

The Conclusion is 'The angles opposite the equal sides are equal.'

Proposition B, Converse to A, (*Euclid* I. 6).—

The Hypothesis is 'Two angles of a triangle are equal.'

The Conclusion is 'The sides opposite the equal angles are equal.'

As in this instance, Converse Propositions lend themselves readily to indirect proof by means of the method '*Reductio ad absurdum*.'

Again, let us examine Euclid I. 4; as an instance of TWO Converse Propositions.

Proposition A, Hypothesis.—

Two sides of one triangle equal each to each to two sides of another triangle.

The included angles equal.

Conclusion.—

The bases equal.

Proposition B Converse of A, Hypothesis.—

Two sides of one triangle equal each to each to two sides of another triangle.

The bases equal.

Conclusion.—

The included angles equal.

Proposition B.B. Second Converse of A :—

Hypothesis.—The bases equal.
The included (*or vertical*) angles equal.

Conclusion.—The sides are equal each to each.

This converse is false, and to rectify it another condition must be added to the hypothesis, viz., that 'the areas of the triangles are also equal.'

Even in simple propositions the converse is not always true. It is true that 'If two triangles have all their sides equal to one another each to each, they have also all their angles equal to one another each to each'; but it is false (taken universally) that 'If two triangles have their three angles equal to one another each to each, they shall likewise have their three sides equal to one another each to each.'

When a false converse proposition is converted into a true one by an addition to the hypothesis, this addition forms in the original Proposition a true (even if unmentioned) portion of the conclusion.'

Thus it is true that 'If two triangles have their three angles equal to one another each to each, *and likewise have their areas equal*, they have their three sides equal each to each.'

Euclid does not always insert even the true converses of his theorems, *e.g.*, Converses of I. 34 :—

'If in any quadrilateral the opposite sides and angles are equal, the figure is a parallelogram' :—

Our Readers should write out in their note-books all the converse propositions, stating whether they be true or false, and what further hypothesis is required to rectify the conclusion.

(4) We are sorry to say that ordinary errors in Spelling are too often made, for instance *separate* becomes *seperate*, *council* is spelt *counsel*, and vice versâ, similarly with *principle* and *principal*, and in history such words as *statue*, *stature*, and *statute* are often confused.

Faults like these go far towards failing otherwise deserving candidates.

(5) *The M.S. Examination Book.*

This consists of six leaves (in addition to cover) of excellent white foolscap, ruled on the right-hand side with thirty-two lines for answering, and left blank for rough work on the left-hand, or under side of leaf. About one-fifth of the ruled side is, on the left, occupied by an unruled margin, which must not be in any way used by the Candidate, but must be scrupulously reserved for the Examiner's marks.

There are, thus, as nearly as possible 150 available full lines in every book, a number that, with scarcely an exception, is amply sufficient for each subject, as the following table will demonstrate.

SCHOLARSHIP QUESTIONS, 1891.

Subject	No. of Questions	No. of Answers Allowed	Total Time	Average time per Answer	Average space per Answer
			hours	minutes	lines
Arithmetic (Men)	17*	14*	3	13	11
Euclid, Algebra, and Mensuration	19*	19	3	9½	8
Arithmetic (Women)	17*	14	3	13	11
Domestic Economy	12	5	2½	30	30
Geography and History	18*	10	3	18	15
School Management	18*	8	2½	19	19
English	13*	6	2½	25	25
Music	6	4	45 min.	11	Allotted
Latin	7	7	2 hours	17	21 lines
German	5*	5	2 "	24	30 "
French	5*	5	2 "	24	30 "

No. of Questions marked thus (*) is not the nominal but the actual number, for two distinct questions are often placed under one head.

Only in the Mathematics is the space circumscribed, but several of the questions can be answered in less than eight lines. Nevertheless it is advisable in the Euclid portion, to write in two vertical columns on one page, and thus save space.

(6) There are a few remarks in the Certificate Articles and Pupil Teacher Course of this month which will repay reading.

(7) We had promised a correspondent to insert model explanations of the earlier rules of Arithmetic, but we find that we have already done so, on pages 151 and 154 of the September issue.

(*N.B.—For Correspondence, see end of Certificate Article.*)

SELECTED GOVERNMENT QUESTIONS.

FIRST WEEK.

1. Explain each of the following grammatical terms, and give an example illustrating its use :—*Infinitive*, *Relative*, *Apposition*, *Government*, *Predicate*, *Dative*, *Subjunctive*, *Transitive*, *Inflection*.

2. Show, by examples, the different uses which may be made in English of the words *what* and *that*. Parse the sentence :—

'What seemed his head
The likeness of a kingly crown had on.'

3. State some of the routes which a traveller to, and returning from, New Zealand, might take. Give an account of *one* of them.

4. Draw a map of the Western States of America, marking in the different States and chief towns.

5. Distinguish between physical, political and commercial geography. Explain the terms, *degree of latitude*, *west longtitude*, *Tropic of Cancer*, *watershed*, *delta*, *Gulf Stream*, and *lunar nodes*.

6. Name four or five poems or poetical extracts, which you think suitable to be learned by heart by the scholars of the Third and Sixth Standards respectively. Give your reasons for selecting them.

7. Describe the earliest lessons in Drawing which should be given in an Infant School.

8. Give the dates of battles of Poitiers, Bannockburn, Pinkie, Marston Moor, Ashdown and Evesham; and deaths of Wallace, Sir John Moore, Nelson and Wolfe.

9. What do you know of Mr. Gladstone's Home Rule Bill (1886), OR, The Assisted Education Act?

10. Write the signature and the descending scale of B minor, using the minor seventh and the minor sixth.

11. Write the signatures of the following keys :—*B major*, *F minor*, *A♭ major*, *G minor*, OR

What is the name for *fah* sharp, *te* flat, *doh* sharp, *lah* sharp?

12. A, B and C start at the same time in the same direction and from the same spot, in a circular course to run round it. A takes 252 seconds, B 231 seconds and C 198 seconds to do so. When will they next meet at the place from which they started?

Ans. 46 minutes 12 seconds.

13. What principal will amount to £42998·1696 in eight years at 20 per cent. compound interest? Ans. £10,000.

14. (*Men only.*) If a side of a triangle be produced, the exterior angle is equal to the two interior and opposite angles, and the three interior angles are together equal to two right angles.

(*Women only.*) Explain clearly the best method of teaching the Seventh Standard to cut out a plain frock for a girl two years old.

15. (*Men only.*) The sum of the squares of the sides of all parallelograms having equal diagonals is invariable.

(*Woman only.*) Describe the evil done by strong drinks to the different organs of the body, and explain why *spirits* should never be given to very young children.

16. (*Men only.*) The radius of a circle is 15 feet. Find the areas of the two segments into which it is divided by a chord equal to the radius. Ans. 20·382, 686·478 sq. feet.

(*Women only.*) Give an account of the materials, preparation, and cooking of an economical and wholesome dinner for a schoolmistress living alone.

17. (*Men only.*) A and B have eighteen coins between them which are all shillings or pennies. A has three times as many shillings as pennies, and B has just as many shillings as pennies. Also A has ninepence more than B. How much has each?

Ans. 6s. 2d; 5s. 5d.

(*Women only.*) Explain the bearing upon a healthy condition of the body of (*a*) Keeping early hours; (*b*) Taking regular exercise; (*c*) Cleanliness; (*d*) Suitable and sensible dressing; (*e*) Good temper.

18. (*Men only.*) Write down the equations whose roots are :—

(*a*) 2 and — 2. (*c*) — 3 and — 2.
(*b*) 3 and — 4. (*d*) ½ and — ½.

Ans. (*a*) $x^2 - 4 = 0$
(*b*) $x^2 + x - 12 = 0$
(*c*) $x^2 + 5x + 6 = 0$
(*d*) $x^2 - \frac{1}{4} = 0$.

SCHOLARSHIP ROUTINE FOR APRIL, 1892.

DAYS	FIRST WEEK			SECOND WEEK			THIRD WEEK			FOURTH WEEK		
	First Hour	Second Hour	Third Hour	First Hour	Second Hour	Third Hour	First Hour	Second Hour	Third Hour	First Hour	Second Hour	Third Hour
MONDAY	Brackets of Algebra (Theory and Practice) — Theoretical Needlework	History from 1760 to 1773	Language	Symbolical Expressions of Algebra — Ingredients of Food	Dates from 1760 to 1787	Language	Fractional Simple Equations — Rules of Health	History from 1787 to 1807	Language	Algebraic Factors — Miscellaneous Geography	Dates from 1767 to 1819	Language
TUESDAY	Euclid, Book I. — Diagram of Nightshirt	Political Geography of North America	Science	First Seven Propositions of Euclid, Book II. — Flannel Sampler	General Geography of Europe	Science	Definitions, Postulates, Axioms of Euclid, Book I. — Calico Sampler	Political Geography of New Zealand	Science	First Sixteen Propositions of Euclid, Book I. — Diagram of Nightshirt	Political Geography of remainder of Polynesia	Science
WEDNESDAY	Averages and Percentages	History of English Language	How to teach Geography	Compound Proportion	Paraphrasing and Repetition	How to teach Spelling	Discount	Paraphrasing and Repetition	How to Teach Mental Arithmetic	Theory of the Four Simple Rules	Parsing and Analysis	How to Teach Composition
THURSDAY	Simple Equations — Savings and Investments	History from 1773 to 1787	Study English from 'Grammar'	Problems in Simple Equations — Preparation of Food	Saxon England after the Heptarchy	Parsing and Analysis	Algebraic H.C.F. and L.C.P. — Clothing and Washing	History from 1807 to 1819	Table of English Literature	Problems in Simple Equations — Miscellaneous Geography	England under the Normans	English Accidence from Text Book
FRIDAY	Deductions upon Euclid, Book II. — Calico Sampler	Political Geography of South America	Theory of Practice	Study any Notes on Euclid, Book I. — Diagram of Nightshirt	Map of Eastern States of America	Stocks	Euclid, Book II. — Flannel Sampler	Political Geography of Australia	Mixtures	Algebraic Formulæ of Euclid, Book II. — Any Needlework	Maps of Victoria and New South Wales	The Metric System
SATURDAY	Language	Science	Drawing	English Composition	Language	Science	Drawing	Repetition, Literature, and Penmanship	Language	Science	Drawing	English Composition	Language	Science	Drawing	Repetition, Literature, and Penmanship

Second Week.

1. Analyse the following and Parse the italicised words :—

'For *who would bear*
The insolence of office and the spurns
That patient merit of the *unworthy* takes,
But that the dread of *something* after death,
The undiscovered *country* from whose bourn
No traveller returns, *puzzles* the will
And makes us *rather bear* those ills we have
Than fly to others that we know not *of*.'

2. Name the sources of our language from which the following words are derived :—*hat*, *shoe*, *vest*, *glove*, *sock*, *bonnet*, *ribbon*, *tunic*, and *shirt*.

3. Write notes of a Lesson on '*An eclipse of the Moon*.'

4. Ships come into English ports from Quebec, Calcutta, Cape Town, Adelaide, and Belfast. What are their probable cargoes?

5. Describe, *in words* only, the course of the Mississippi.

6. Explain what may be done by the help of Reading Books to impart geographical and historical information in schools in which geography and history are not taken as Class Subjects.

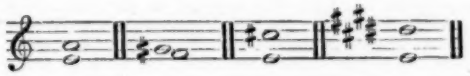
7. On receiving new scholars in the school what is the best way of deciding in what class to place them? Give reasons.

8. What measures did the Scots take upon the death of Charles I.? Briefly describe the campaign ending with the battle of Worcester.

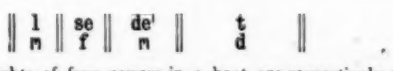
9. By whom were the battles of Plassey, Brandywine, and Salamanca fought, and with what results?

10. Write the signature and descending scale of C minor, using the major seventh and the minor sixth, OR, Write a descending minor scale (*lah* mode), using the major or essential seventh and the minor or essential sixth.

11. Describe the intervals formed by the following pairs of notes :—



OR,



12. The weights of four rowers in a boat are respectively 10 st. 6 lbs., 10 st. 9 lbs., 11 st. 1 lb., and 11 st. 3 lbs. The average weight of the whole crew, including the coxswain, is 10 st. Find his weight.
Ans. 6 st. 9 lbs.

13. 800 yards of cloth are bought at 10s. 6d. per yard; half is sold for 10s. per yard, a fifth for 11s. At what price per yard must the remainder be sold to obtain a profit of 5½ per cent. on the whole?
Ans. 12s. $11\frac{1}{10}$d.

14. (*Men only.*) Write out Euclid I. 4. If the diagonals of a quadrilateral bisect each other at right angles it is a rhombus.

(*Women only.*) What amount of material is required for a woman's gown, for a man's shirt, for a frock for a child three years of age? Explain, as to a Pupil Teacher, why that amount of material is required for any *one* of the above garments.

15. (*Men only.*) Work out Euclid II. 5. Of all rectangles with the same perimeter the square has the greatest area.

(*Women only.*) '*Every girl should learn to hem, to sew, to gather, to stitch, to whip, to make button-holes, to fine draw, to knit, and to darn; and after that to cut and contrive.*' Why is this desirable, and how would you endeavour to obtain this result?

16. (*Men only.*) A circle is 4 feet in circumference. Find the area of the inscribed square. Ans. ·81 sq. ft.

(*Women only.*) On what weekly wages can an artisan comfortably maintain himself, his wife, and four children between the ages of four and ten. In what proportion should he distribute these wages in rent, food, clothing, recreation, benevolence, and savings?

17. (*Men only.*) Prove the rule for finding the H.C.F. of two expressions which have no monomial factors.

(*Women only.*) Name the materials and proportionate quantities for (*a*) a rice pudding, and (*b*) a batter pudding.

18. (*Men only.*) (*a*) $\sqrt{(4x+1)} - \sqrt{(x+3)} = 2$.
Ans. 6 and $-\frac{2}{3}$.

(*b*) $\sqrt{(7x+1)} - \sqrt{(3x+10)} = 1$.
Ans. 5 and $\frac{3}{4}$.

Third Week.

1. Give the past tenses of the verbs *crow*, *hew*, *sing*, *win*, *help*, *bid*, *chide*, *write*, *dig*, *lie*, *get*, *shear*, and any obsolete forms of those tenses.

2. Give examples of Noun, Adjective, and Adverbial clauses employed as subordinate sentences.

3. Write notes of a Lesson on '*The employment of colonists in Western Australia*, OR, *in Manitoba*.'

4. Where are Khartoum, Herat, Munich, Washington, Saragossa, Sedan, Utrecht, and Delhi? Describe one of these places.

5. Describe the boundaries between British North America and the United States.

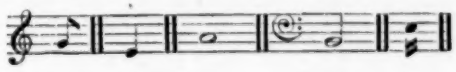
6. '*Word building*' is a common exercise in the upper classes of a school. Give some examples of this exercise, and say what is the use of it.

7. Describe the best system you know of Drill and Physical Exercise *for young children*, (*a*) in the Schoolroom, (*b*) in the Playground.

8. What right had William the Third to the throne of England? Explain the terms '*Prince of Orange*,' '*Stadtholder of Holland*.'

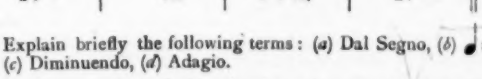
9. What was the Quadruple Alliance? Against what powers was it formed and with what objects?

10. Write the pitch and duration names of the following notes, and write the signs for rests of corresponding value :—



OR,

Rewrite the following: (1) Halving the value of every note and (2) doubling the value of every note and rest :—



11. Explain briefly the following terms: (*a*) Dal Segno, (*b*) ♩ = M.60, (*c*) Diminuendo, (*d*) Adagio.

12. If the larger wheel of a bicycle whose circumference is 8 yards 5½ inches makes 200 more revolutions than that of another bicycle in travelling 5 miles, find the circumference of the latter wheel.
Ans. 10 yards.

13. 320 men begin a piece of work; it is completed in 6 days of 10 hours each, but on each day only half of those employed on the previous day are at work. In what time would 105 men, working 6 hours a day, have completed it? Ans. 10 days.

14. (*Men only.*) Write out Euclid I. 5. All isosceles triangles on the same base have their vertices in the same straight line.

(*Women only.*) Explain clearly the duties of a housemaid *or* nursemaid.

15. (*Men only.*) Write out Euclid II. 6. If the base of an isosceles triangle be divided externally in any point, prove that the square on the line, joining the vertex of the triangle with that point, is greater than the square on a side of the triangle, by the rectangle contained by the segments of the base produced.

16. (*Men only.*) One side of a triangle is 15 feet. It is required to divide the triangle into five equal parts by straight lines parallel to one of the other sides. Find the distances to four places of decimals from the vertex of the points of division of the given side.
Ans. 6·7082; 9·4868; 11·6190; 13·4164 ft.

(*Women only.*) Give plain rules to a Pupil Teacher for preserving her health when she lives (*a*) in the country a mile from school, and (*b*) in London only a few doors away.

17. (*Men only.*) Find the value of a, in order that one of the roots of $100x^2 + 60x + a = 0$ may be double the other. Ans. $a = 8$.

(*Women only.*) Compare the advantages and defects of each of the following articles of food: (*a*) fish; (*b*) lean beef; (*c*) cheese; (*d*) potatoes.

18. (*Men only.*) A number of two digits is equal to seven times the sum of its digits; show that one digit must be twice the other.

Fourth Week.

1. Write a short essay upon *Temperate Habits.*

2. Paraphrase the following:—

'Our bugles sang truce, for the night-cloud had lowered,
And the sentinel stars set their watch in the sky,
And thousands had sunk on the ground overpowered,
The weary to sleep and the wounded to die.

'When reposing that night on my pallet of straw,
By the wolf-scaring faggot that guarded the slain,
At the dead of the night a sweet vision I saw,
And thrice ere the morning I dreamt it again.'

3. Write notes of a Lesson on one of these cities: New York, Quebec, San Francisco.

4. What is the '*Solar System*'? Draw a diagram to illustrate your answer.

5. Enumerate the North American rivers that flow into the Pacific Ocean. Where and what are the cañons?

6. What are the best expedients you know for quickening and securing the attention of a languid or disorderly class?

7. '*The answers given by children are too often confined to single words.*' Why is this objectionable, and what means can be adopted to encourage children to make complete statements?

8. Name, in order, the chief victories of Nelson. Give a short account of the battle of Trafalgar and its political results.

9. Name the statesmen and philanthropists of the reign of George the Third who aimed at the abolition of the slave trade. How was this infamous traffic carried on?

10. Write the signatures of B♭ Major, D Minor, A Major, B Minor, OR, What is the name for *ray* sharp, *lah* flat, *soh* sharp, and *me* flat?

11. Write out the air of *either* 'Rule Britannia' *or* 'The Old Hundred.'

12. If I invest £9,975 in the Three-and-a-Half per Cents. at 99¾, what annual income shall I receive? Ans. £350.

13. £52 18s. is made up of half-sovereigns, half-crowns, and sixpences in the proportion of 3, 5, 7. How many coins are there? Ans. 345.

14. (*Men only.*) Write out Euclid I. 13. The bisectors of the adjacent angles which one straight line makes with another are at right angles to each other.

(*Women only.*) State the special points which should be attended to in teaching *hemming, sewing, stitching*, and *setting in* to girls.

15. (*Men only.*) Write out Euclid II. 7. If a straight line, AB, be divided into any two parts at C, and AC be divided into any two parts at D, the squares on BC, CA, AB are together double of the three rectangles BC.BD and CA.CD and AB.AD.

(*Women only.*) What would you do before the doctor came if a child in your school (*a*) was badly scalded, (*b*) had fainted, (*c*) had cut his arm above the elbow?

16. (*Men only*). An equilateral triangle and a square have the same area. Compare their perimeters.

Ans. Perimeter of triangle is 1·14 times that of the square.

(*Women only.*) Give an account of the price, material, colour, and making-up of a neat dress for your own summer wear in school, and say how it should be washed and worn, so as to last as long as possible.

17. (*Men only.*) In a certain proper fraction the difference between the numerator and the denominator is 12, and if each be increased by 5, the fraction becomes equal to ⅔. Find it. Ans. 11/23.

(*Women only.*) What mode of investing her future savings do you consider the best for a young woman entering on her career as a schoolmistress? State what you know respecting some of the methods of investment now available for small savings.

18. (*Men only.*)
(*a*)
$$\left.\begin{aligned} x + 2y - 3z &= 6 \\ 2x + 4y - 7z &= 9 \\ 3x - y - 5z &= 8 \end{aligned}\right\}$$

Criticise these equations.

(*b*)
$$\left.\begin{aligned} x + 2y + 3z &= 4 \\ 2x + 3y + 4z &= 6 \\ 3x + 4y + 5z &= 8 \end{aligned}\right\}$$

STANDARD PROBLEMS.—STEP BY STEP.

With Blackboard Examples.

BY JOHN PENDLEBURY.

Standard IV.

If Standard IV. children have been thoroughly drilled in working problems when they were in Standard III., very little difficulty will be experienced by the teacher in getting them to work all monetary problems in their new standards. In addition to this they must be thorough masters of all the weights and measures tables as far as possible, and must be well drilled in the solution of easy mental problems. The problems they will be expected to work are very varied, but we will try to give as typical examples as possible. Insist on them putting down the problems in style similar to the examples below, and impress upon them the absolute necessity of care, neatness, style, and accuracy, if they want to obtain full credit for their work. *Examples for blackboard demonstration*:—(1) A man bought 1 cwt. of sugar for £2 4s. 6d., and sold it again for 5½d. per lb. How much money did he gain? Write this on blackboard. Then give the following mental exercises, seeing that each child *tries to think*: 2 lbs. of sugar at 3d. a lb.? 6d. 3 lbs. of tea at 2s. a lb.? 6s. 2 lbs. of rice at 3½d. a lb.? 7d. 4 lbs. of rice at 5½d. a lb.? 5½d. × 4 = 22d. = 1s. 10d. Bought a knife for 2s., sold it for 2s. 6d. What profit? 6d. Bought some butter for 2s. and sold it for 1s. 4½d. What loss? 7½d. Bought 2 lbs. of sugar for 6d., sold it at 4d. a lb. What profit do I make? 2d. What did I give for it per lb.? 6d. ÷ 2 = 3d. Bought 6 knives for 2s. 6d., and sold them for 6d. each. What did I sell them for? 3s. What profit did I make? 3s. — 2s. 6d. = 6d. How many lbs. in a cwt.? 112. Sold a cwt. of apples for 10s., bought them for 1d. a lb. What did I buy them for? 112d. = 9s. 4d. What profit did I make? 10s. — 9s. 4d. = 8d. This brings us to the problem above (1). Proceed to question thus: What did he give for the whole cwt.? £2 4s. 6d. Place this on one side. How many lbs. did he buy? 112. How many did he sell? 112. What at? 5½d. a lb. How much did he get for it? '*Tell me in words.*' Encourage the children to give an answer in words *always*, thus: '*He gave* 112 *times* 5½*d.*' Let them obtain this by their ordinary method of multiplication. Now we know what he paid for it all, and know what he sold it all for, how do we find out his profit? Get the scholars into the habit of saying here: '*By finding the difference between what he paid and what he got for it.*' They will already (remembering their Standard III. work) know that *to find the difference* we must *subtract*. The finished working will appear on the board as a model for their guidance thus:—

£	s.	d.		£	s.	d.	
		5½	× 2	2	11	4	selling price
		10		2	4	6	buying price
4	7						
	11						
2	10	5					
	11						
2	11	4					

6 10 profit. Ans.

(2) A man bought 100 bullocks at £3 each; ten of them died. At what price must he sell each of the remainder so as to get what he bought them for? *Mental Exercises.*—A boy give 1s. for two knives. He lost one. What must he sell the other remaining one for so as to lose nothing? 1s. A girl paid 6d. for 3 flowers. One got crushed. What must she sell the remaining ones for so as to lose nothing? 6d. How many remain? 2. What part of the 6d. will each one have to fetch? Half. How do we find half? Divide by 2. 6d. ÷ 2 = 3d. each = price they must be sold at. How do you find a third, a fifth, a ninth, a twentieth, a sixty-fourth, a two-hundred and forty-ninth? By *dividing* by 3, 5, 9, etc. Proceed to question on (2). Tell me *in words* what he gave for the bullocks. 100 times £3; that is, 100 must cost 100 times what 1 cost. This equals £3 × 100 = £300. Now the man wants to sell them so as to get what he bought them for. How much must he get for them? £300. And how many has he to sell now that ten are dead? 100 — 10 = 90. If he gets £300 for ninety, what part of that does he get for one? One-ninetieth. How do we find that? Divide £300 by 90. Insist on the children giving their answers in a clear, concise and grammatical form. Above all things avoid *every lesson* the method of answering in jerky unexpressive monosyllables, to which children are so often subject. The finished work will appear thus:—

100 bought
10 died

90 left to be sold.

90)£300(£3 6s. 8d. Ans.
270
30
20
90)600(6
540
60
12
90)720(8
720
...

(3) A farmer bought eight bullocks at £13 each. He kept them for six weeks, costing him 1s. 6d. each per week. He then sold them for £100. How much did he lose? After thorough explanation of (2), this will present little difficulty. Lead the children step by step, thus:—How much did he give for them? Eight times £13, which equals £104. How much had he to pay extra to keep one bullock for a week? 1s. 6d. And how much for all of them? 1s. 6d. × 8 = 12s. Now, he kept them for six weeks. What did that cost him? Six times 12s., which equals 12s. × 6 = 72s. = £3 12s. What was the *total* cost of the bullocks to him, then? £104 + £3 12s. = £107 12s. Now, if he sold them for £100, what did he lose? £107 12s. — £100 = £7 12s. Ans. Place each step upon the blackboard, thus:—

£13 cost of 1
8 bullocks

£104 cost of 8.

£ s. d.
0 1 6 cost of keep of 1 for 1 week
8

0 12 0 „ „ 8 „
6

3 12 0 „ „ 8 for 6 weeks.

£ s.
104 0 cost of buying
3 12 „ keep

107 12 total cost
100 0 selling price

7 12 loss. Ans.

(4) A furniture dealer had £100 in his purse. He bought thirteen tables at 50s. each, and with the remainder he bought chairs at 7s. 6d. each. How many chairs did he buy? Give the following mental exercises:—A man had 1s. He spent 4d. What had he left? 8d. With this remainder he bought some cakes at 2d. each. How many did he buy? Four; that is, 8d. ÷ 2d. = 4. Get the children to see that he buys as many cakes as there are twopences in eightpence. A boy has 5s. He buys two books at a shilling each. What does he spend? 1s. × 2 = 2s. What has he left? 5s. — 2s. = 3s. With this remainder he buys some knives at 6d. each. How many sixpences has he? 3s. × 2 = 6. Why do I multiply by 2? Because there are two sixpences in one shilling. He buys one knife for every sixpence. How many can he buy then? Six. Proceed in detail with (4). The dealer bought thirteen tables at 50s. each. What did they cost him? Thirteen times 50s. = 50s. × 13 = 650s. = £32 10s. What has he left? £100 — £32 10s. = £67 10s. Now, he buys chairs with that at 7s. 6d. each. Tell me in words how many chairs he gets? He gets as many chairs as there are 7s. 6d. in £67 10s. Now, every Standard IV. child ought to know that to find out how many times one amount is contained in another we must divide the one by the other. Let a boy try before the class to divide £67 10s. by 7s. 6d. They will all see that in its present form the division cannot be performed. What must we do? Reduce them *both* to *pence*, thus:—7s. 6d. = 90d., and £67 10s. = 16,200d., *or*, *better still*, reduce them *both* to *sixpences*, thus:—7s. 6d. = 15 sixpences and £67 10s. = 2,700 sixpences. Find how often one is contained in the other by division, thus:—16,200 ÷ 90 = 180 *or* 2,700 ÷ 15 = 180. The children will *see for themselves* that it is immaterial whether they bring them both to *pence* or to *sixpences*, but the *latter* is the more *preferable*. Why? Because we are dealing with lesser figures, and less working is needed. *Both give the same result.* Therefore he could buy 180 chairs, which is what was required to be known. Full working must be show on blackboard, as follows:—Teacher *cannot* be too *careful* as to his own *everyday style* of working, as they will copy his style whatever he says or does. Blackboard model of number (4) above.

50s. cost of 1 table
13 tables

650s. cost of 13 tables.

£ s.
100 0 money in purse
32 10 „ spent on tables

67 10 „ left in purse.

s. d.
7 6
2

15 sixpences.

2)650s.
£32 10s.

£ s.
67 10
20

1350
2

2700 sixpences.

15)2700(180 chairs = Ans.
15
120
120
... 0

(5) The wall of a room is 350 sq. yds., 9 sq. ft., 72 sq. in. in area. Find the cost of painting it at 2d. per sq. ft. Write the above on blackboard. Give the following mental exercises:—If a sq. ft. of cloth costs 2s. 6d., what for half a foot? 1s. 3d. How many inches in half a sq. ft.? 72; that is, half of 144. If brass is 10d. a sq. ft., what for 72 sq. in.? Half; that is, 5d. What would it cost to paint a plank which covers 5 sq. ft. at 2d. a sq. ft.? 10d. What would it cost to paint 2 sq. yds. at 6d. a foot. The boys will readily see that they must first find the number of *feet* from the *area* given if it is quoted at so much a foot. 2 sq. yds. = 18 sq. ft. and 18 sixpences = 9s. Now proceed to question the class thus, keeping a keen eye upon the backward ones, and constantly plying them with questions and encouraging them to answer. A good plan is sometimes to ask these dull scholars such simple questions that they cannot fail to *know* the answer, and get them to express their answer *at once* brightly and smartly. The cost in the sum number 5 is expressed at so much per foot. Impress upon them that they must always keep their eyes open and their wits about them, and be on the sharp look out for such traps. It is *not* 2d. per *inch nor* 2d. per *yard*, but *exactly* 2d. per *foot*. Tell them *repeatedly* (it cannot be too often) that they must not make a rush straight at their problems or they will often find when half-way through it that they are on the wrong track, and their work is in vain and faulty. They must *read it very carefully through more than once*, so as to get a thorough grasp of the meaning conveyed by the words, and then proceed carefully to the solution in detail. Upon young teachers generally, particularly pupil teachers, we cannot too resolutely impress the importance of *training* and *leading* their pupils in the steps just pointed out. Now in sum (5) how many feet have we? We don't know, but can soon find out by getting or *reducing* the yards to feet. This will present little, if any, difficulty, and may be left with them. 3,159 sq. ft. How many twopences will have to be paid then? 3,159 = 6,318 pence. Reduce to £ s. d. = £25 6s. 6d. Now what will the 72 sq. in. or the *half-foot* cost? 1d. Therefore, the total cost = £26 6s. 7d. Ans.

350 sq. yds. 9 sq. ft.
9 sq. ft.

3,159 sq. ft.

3,159 twopences
2

12)6,318 pence.

£26 6 6 cost of the ft.
1 cost of half-ft.

£26 6 7 total cost. Ans.

20)526 + 6
£26 6 6

(6) A ship has 240 passengers on board, and each passenger drinks 1 pint of beer a day. How many 9-gallon casks will be used in 21 days? *Mental exercises:* How many quarts in a gallon? 4. How many pints? 4 × 2 = 8. How many gallon casks would hold 8 pints? 1. How many gallon casks would hold 24 pints? 24 ÷ 8 = 3 casks. How many pints in 4 gallons? 8 × 4 = 32. How many pints in 9 gallons? 8 × 9 = 72 pints. Now in sum (6) how many pints do the people drink in 1 day? 240 times 1 pint = 240 pints. How many pints will they drink in 21 days? 21 times what they drink in 1 day; that is, 240 pints × 21 = 5,040 pints. Now what do they draw these *pints* from? *9-gallon* casks. How many pints will 1 cask hold? 8 × 9 = 72 pints. How many of these casks holding 72 pints shall we require to supply 5,040 pints to the passengers? Divide 5,040 by 72 = 70 casks. Ans.

1 pint
240 people

240 pints.

240 pints in 1 day
21 days

5,040 pints in 21 days.

8 pints in 1-gal. cask
9 gal. cask

72 pints in 9-gal. cask.

Pints.
72)5040(70 9-gal. casks. Ans.
504
...0

(7) A man and his son earn £3 10s. a week. The man earned six times as much as his son. What will each earn in a year? (1 year = 52 weeks.) The most important point for the teacher in sums of this class is to get the scholars into the correct method of easy division into proportionate parts. Try some such method of illustration as the following:—Give one of the boys a piece of stick, easily broken. Now tell him you want him to break off a piece which shall leave a piece in his hand twice as long as what he broke off. He will guess this nicely. Then let him break the larger piece into halves. Now how many *equal* pieces have you? 3. Now show them that to divide it into *two* parts, one of which must be twice as long as the other, you really divide it by your eye into *three* parts, and for the shorter stick you take *one* part and for the longer you take *two* parts. The children will follow this with interest, and when thoroughly understood they will *feel* they have *learnt something*, a feeling we should try to create and stimulate on every possible opportunity. Take another example: Draw a line on the blackboard. Call out a boy. Tell him you wish that line divided into two parts by a cross line, such that one part shall be three times the length of the other. He may fall into the error of dividing the line into *three* equal parts mentally, and taking two of them for the larger line. Never mind. Ask how many times the longer line is longer than the short one. They will all answer 'twice as long.' But I said three times as long I wanted it. The mistake will bring about its own exposure and ready correction. We must really divide the line mentally into *four* equal parts, and the longer line will be *three* of them and the shorter will be *one* part; that is, one will be three times as long as the other. Carry the examples still further. I have 5 apples to divide between two boys, and I want to give one four times as many as the other. How many must I give to each? The answer will be readily given: 4 to one, and 1 to the other, which makes up the total apples. I have 7d., and I want to divide it between two girls, giving one six times as much as the other. What must each have? One must have 6 pence and the other 1 penny. 6d. + 1d. = 7d. The children will now be fully awake to the fact that if we wish to give one person *six times* as much as another person out of something we have, we must first *divide* that something into *seven* parts and give him *six* of them, leaving the remaining one for the other person. Now in (7) the man and boy get £3 10s. *together every week*. Reduce to shillings for convenience, £3 10s. = 70s. Now we *must* divide this into *seven* equal parts, and give the man *six* of them and the boy *one*, if the man is to have six times as much as the boy. Now 70s. ÷ 7 = 10s. Therefore, the boy has earned 10s. in one week and the man 10s. × 6 = 60s. = £3 in one week. How many 10s. will the boy earn in year? 52. Then 10s. × 52 = 520s. = £26. How many 3 pounds will the man earn in a year? 52. Then £3 × 52 = £156. *Prove it.* We said the man had to have earned *six times* as much as the boy. Now, the boy earned £26, and £26 × 6 = £156 = man's share.

£3 10s. 7)70s. 10s.
20 — 6
— 10s. boy's wage in 1 wk. —
70s. 2£)60s.
—
£3 man's wage in 1 wk.

10s. £3
52 52
—
2£)520s. £156 man's yearly wage. Ans.

£26 boy's yearly wage. Ans.

(8) A gentleman divides 68 lbs. of tea among 76 old women and 60 old men. How much tea would each person have? How many persons had he to divide the tea amongst? 76 + 60 = 136. Can he give them a lb. each? No. What must he do with his lbs., then? He must get them into ozs. Now 68 lbs. = 1,088 ozs. Now if these have to be divided amongst 136 persons, what share will each get? One one-hundred-and-thirty-sixth, and we get that by division. 1,088 ÷ 136 = 8 ozs. each person. Ans.

76 men 68 lbs. 136)1,088(8 ozs. each. Ans.
60 women 16 1,088
— — —
136 persons. 408 .....
68
—
1,088 ozs.

(9) I buy 324 gallons of milk for £14 6s. 8d. and sell 128 gals. at 10d. per gal. What is the price of the remainder per gal.? Deal first with what I sold. 128 gals. at 10d. per gal. cost 128 times 10d. = 1,280 pence = £5 6s. 8d. Now how many gallons have I left? 324 — 128 = 196 gals. And what money am I out of pocket yet? £14 6s. 8d. — £5 6s. 8d. = £9. What is the price of one of the remaining gals., then? One-hundred-and-ninety-sixth part of £9. How do we find that? By dividing by 196. £9 ÷ 196 = 11$\frac{4}{196}$d. = 11$\frac{1}{49}$d.

10d. cost of 1 gal. sold. 324 bought £ s. d.
128 gals. 128 sold 14 6 8 paid
— — 5 6 8 drawn
12)1,280 pence 196 left. —
— £9 0 0
2£)106 8d.
—
£5 6s. 8d.

£ £ s. d.
196)9 (0 0 11$\frac{1}{49}$. Ans.
20
—
180
12
—
196)2160(11d.
196
—
200
196
—
$\frac{4}{196} = \frac{1}{49}$.

(10) In a school of 350 boys, 100 pay 3d. per week, 200 pay 2d., and the rest 1d. per week. How much school pence can be obtained in a month? Caution them to first obtain how much will be drawn in a week. 100 at 3d. = 100 times 3d. = £1 5s. 200 at 2d. = £1 13s. 4d. How many are left to pay 1d.? 350 — (100 + 200) = 50, and 50 at 1d. each = 4s. 2d. Total drawn in one week = £1 5s. + £1 13s. 4d. + 4s. 2d. = £3 2s. 6d. How many weeks in a month? Four. Then how much will be drawn in a month? *Four times* what is drawn in a week. That is, 4 times £3 2s. 6d. = £3 2s. 6d. × 4 = £12 10s.

Blackboard sketch of number 10:—

4)100 threepences 6)200 twopences 200
— — 100
2£)25s. 2£)33 + 2 „ —
— — 300
£1 5s. £1 13s 4d.

£ s. d.
350 pay 3d. 2d. or 1d. 1 5 0 at 3d.
300 „ „ or 2d. 1 13 4 „ 2d.
—
50 pay 1d. = 4s. 2d. 4 2 „ 1d.
—
£3 2 6 total fees.

£ s. d.
3 2 6 total fees in one week
4 weeks = one month
—
£12 10 0 total fees in a month = Ans.

Government Problems for Tests or for Class Demonstration.—R. = Reduce. The other letters will be understood. (1) A man bought 10 boxes of fruit, each weighing 1½ cwt. The boxes when empty weigh 30 lbs each. How many pounds of fruit did he buy? (R. cwt. to lbs. S. 30. M. by 10.) Ans. = 1,380 lbs. (2) What shall I have left out of £12 if I give 39 men 3s. 6d. each and 27 women 2s. 9d. each? (M. 3s. 6d. by 39 M. 2s. 9d by 27 A. S.) Ans. = £1 9s. 3d. (3) A dealer bought eleven sheep and twenty-one lambs for £69 15s. Each sheep cost £3. Find the cost of a lamb. (M. £3 by 11 S. D. by 21.) Ans. = £1 15s. (4) A boy rises at 5.30 and his brother at 6.15. How many hours does the former gain in 30 days? (S. M. by 30, R. to hours.) Ans. = 22½ hours. (5) If a man takes 60 steps of 2½ feet each in a minute, how many miles will he walk in 1½ hours? (M. 2½ ft. by 60 R. 1½ hrs. to min. = 90 M. ft. by 90 R to mls.) Ans. = 2 mls. 4 fur. 18 pls. 1 yd. (6) Thirty sheep cost £75, and were sold for £90. What was the gain on each sheep? (S. D. by 30.) Ans. = £0 10s. (7) A man earns £2 per week, and spends 5s. on each of 6 days in the week. What does he save in a year? (5s. × by 6 = 30s. £2 — 30s. = 10s. and 10s. × 52 = £26. Ans.) (8) If I buy two oranges for three halfpence and sell them at 1d. each, how much do I gain if I sell a gross? (2 for 1½d. = ¾d. each. 1d. — ¾d. = ¼d. gain on 1 orange.) Ans. = 144 farthings = 3s. (9) How many heaps of money, each containing a half-crown, a florin, a shilling, a sixpence, and a penny, can be made out of £37 8s. 3d.? (2s. 6d. + 2s. + 1s. + 6d. + 1d. = 6s. 1d. £37 8s. 3d. ÷ 6s. 1d. R. both to pence and divide.) Ans. = 123. (10) A cistern holds 370 gallons. A man goes four times a day to it with a bucket holding 2½ gallons. How much is left at

the end of 15 days? (2½ × 4 = 10 gals. 10 × 15 = 150 370 — 150.) Ans. = 220 gals. (11) A man earns £2 7s. 6d. a week. He spends 30s. for food, 5s. 9d. for lodging. How much does he save in thirteen weeks? (A. S. M.) Ans. = £7 12s. 9d. (12) A farmer sells 8 sheep at £4 7s. 6d. each, and 9 pigs at £3 6s. 8d. each. He then buys 4 cows, and finds he has £5 left. How much did each cow cost? (M. M. A. S. D.) Ans. = £15. (13) A grocer mixes 15 lbs. of sugar at 4d. per lb., and 5 lbs. at 6d. per lb. What is the price of the mixture per lb.? (M. M. A. D. by 20.) Ans. = 4½d. (14) In a box of 6,000 screws, 9 out of every quarter of a hundred are bad ones. How many bad ones in the box? (D by 25 M. by 9.) Ans. = 2,160. (15) If a shot from a gun travels at the rate of 400 yds. in a second, how long will it take to travel 25 mls? (R to yds. call secs. R.) Ans. = 1 min. 50 secs. (16) A horse and cart cost £112. The horse cost 3 times as much as the cart. What was the value of the horse? (D. by 4 = cart × 3 = horse.) Ans. = £84. (17) A woman gets £14 10s. 3d., and three girls get £3 15s. 9d., 17s. 6d., and 16s. 6d. After paying these their wages, what would be left out of a twenty-pound note? (A. and S.) Ans. = £0. (18) If three pennies weigh one ounce, what will £12 worth of pennies weigh in pounds? (R. to d. D by 3 call ozs. R. to lbs.) Ans. = 60 lbs. (19) I bought 1 acre 1 rood of land for £180. After spending £10 15s. in draining it, I sold it at £25 per rood. What was my whole profit? (Caution as to finding selling price. 1 ac. 1 rd. = 5 rds. £25 × 5 = £125. It cost £180 + £10 15s. = £190 15s. *Profit* was £190 15s. — £125.) Ans. = £65 5s. *loss*. (20) A man gave a ten-pound note for some pigs at thirty shillings each. He had a sovereign change. How many pigs did he buy? (£10 — £1 = £9. £9 ÷ 30s. = 180s. ÷ 30s.) Ans. = 6 pigs.

DECORATIVE EMBROIDERY.

BY MAY MORRIS.

Design.—The most important element in successful work is the choice of design, and I shall therefore be obliged to linger a little over this subject, as it is impossible to make a clear explanation to those of my readers to whom the subject may be entirely strange without a good deal of enlargement of general axioms. While inferior work can be tolerated for the sake of the design, if that is good (though the two rarely go together), excellent work on a worthless design must be cast aside as labour lost; so that, you see, design is the very soul and essence of beautiful embroidery, as it is of every other art, exalted or humble. It is enough to break one's heart to see the labour and skill sometimes spent over would-be decorative ornament, that instead of being full of meaning and intention, is more like a heterogeneous collection of unmeaning shapes, lacking form, which the designer if put to it could as ill explain as anyone else. Having said this much, I must here say what I mean by design worthy to be wedded to good work. First we must consider the nature of Design generally and ask, for instance, *(a)* Why the otherwise blank surface of the wall of my study is decorated by a patterned paper; and *(b)* Why this particular paper is chosen of willow-boughs rather than roses or honeysuckles, or any other growth? *(a)* In the first place, it is one of man's instincts to beautify his life by whatever means in his power, and the paper printed in colours with some ornamental form is more pleasing in his sight than the bare blank surface of plain white or colour. This is the instinctive *pleasure in life* (the '*joi de vivre*' in the comprehensive sense), which makes life desirable, but which is too often restrained or even altogether crushed out of us by external circumstance. *(b)* Again, the ornamented surface takes the shape of willow-boughs on account of my own especial fancy for them, and the pleasant river-scenes they recall; this consitutes the *personal* element in taste or fancy, and it is this individuality which divides what is called 'original' work from that which is wanting in character and vigour; in a word, lifeless. Thus we have the instinct, and the more or less developed capacity of man to adorn his life, on the one hand, and on the other, the individual taste which directs that capacity on to this, that, or the other lines: Design embodying these two elements, universal and individual.

The application of decorative design in connection with the minor arts or handicrafts, as they are called, will obviously be for the adornment of articles of daily and of especial use. Every commonest article of every-day use shows the remains (machine-made now, of course) of what was once put on by hand in the course of making the article, by way of decoration, such as the rim of blue or pink colour round the edge of a penny plate, or the star at the bottom of a beer-house tumbler. As in embroidery, we have only to do with decorative design applied to flat surfaces, and especially to textiles. I must, in so large and interesting a subject, limit myself to this particular branch. Given a certain space, the aim of the designer is to lay on it ornament (*a*) pleasing to the eye and (*b*) suitable to the materials in hand, and to the future use of the article when finished. For the present we only have to deal with the former pleasure-giving quality. Now, the modern tendency (a reaction, doubtless, from the Renaissance conventionality which has so long held its ground) is to copy some spray or bough directly from nature, and to lay it down haphazard on the surface to be ornamented, a few stray petals or a broken leaf and a caterpillar being peppered about elsewhere without rhyme or reason; this is then called a 'quaint' design. When I tell you that symmetry, order, and balance are above all things essential, and that no imitation of the pictorial art (for that it is what it amounts to) in such dissimilar and insufficient materials is permissible, you will understand that the 'quaint' design is wrong in the very nature of it. The given space must be filled by forms in certain rhythmical sequence, either masked or plainly marked. If it should be a square, the surface may be covered all over, or if something simpler is required, an ornament may be placed in the middle, and something in each corner. In designing for reproduction by mechanical means the various forms are arranged so as to be repeated in regular order; but for our purpose, repetition of a design should be sparingly employed, and principally for large surfaces; for the great charm of embroidery lies in its richness and diversity of invention, within certain well-understood limits.

You will have often heard the words *convention* and *conventional* used as opposed to *naturalistic* forms in a decorative design. Now, the first thing the designer will do is to go to natural growths and animal life, and show his pleasure in them by studying their infinite variety and beauty, and introducing them into his work. These studies should be constantly and faithfully made, until the artist has familiarised himself with all possible peculiarities and diversities of such things. But his own work should merely recall nature, not absolutely copy it; the living flower should give birth to a living ornament in his brain, certain characteristics being dwelt upon, but the forms all simplified, leaves flatly arranged, stems bent into flowing curves to fill the required spaces. Whatever growth is chosen as a model will thus be *re*-presented by the draughtsman's hand, but translated, as it were, and serving the purpose of giving delight almost as

well as when growing in the fields: in exchange for the subtle, unconscious, and untranslatable beauty of nature, we get the charm of conscious art, the artist exacting service from nature, and obtaining it, graciously and ungrudgingly given just so far as it is lovingly and frankly asked for. Here is (Fig. 1) a

Fig. 1.

sketch of a rose-bud, conventionalised a great deal, as you will notice; as a *likeness* of the rose-bud it is too rough to be worth much, but quite sufficiently recalls the real thing for the purposes of needlework. It was not drawn without careful consideration of a live rose-bud, all the little nicks in the leaves, and twirls of the tendrils being admiringly noted, but not reproduced in this sketch.

Thus much of Convention then as an essential of decorative design. Next I would ask you, when you have a design for flat decoration in your hands, or are yourself designing, to consider carefully whether it fulfils its first purpose of well and symmetrically covering a certain defined space? If this space is not so filled, the resulting ornamentation must be rejected as not fulfilling its function. The following sketches (Figs. 2 and 3) may roughly supplement this. Given a square space to be ornamented simply, two ways of doing so

Fig. 2.

are shown: In the one (Fig. 2) a spray is 'gracefully and negligently,' as a fashion-paper would say, laid in one corner, a leaf or two stuck on somewhere else, no matter where. The spray is inoffensive in itself, but however beautifully and carefully it may be drawn, there is no form or symmetry in the grouping; in fact, no thought. Next we have a square (Fig. 3) with rosettes at the four corners, little spots running along the edge forming a border, a circle in the middle, with more spots round it, forming a centre rosette. The whole is a mere grouping of spots, big and little, symmetrically arranged, simply, but sufficiently decorative, when compared with Fig. 2.

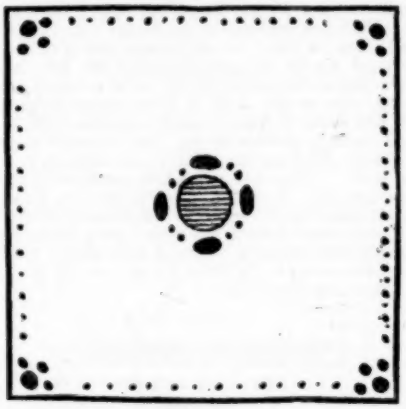


Fig. 3.

However, having warned you against the dangers of so-called 'naturalism,' I must point out that conventionalism in the extreme brings us to an equally unsatisfactory result; that is, when natural objects are so changed as to become either grotesque or meaningless; in fact, a 'conventional' design in common talk means something of this sort—forms which have now no true relation to natural growths. It would be of service to us here, as an illustration, if we could compare the convention of, say, the design of a fourteenth century embroidered cope (of no more than ordinary beauty, but good of its style) with the design of some late Renaissance quilt or hanging, or what not. In the earlier work we have the convention which compels natural objects into a certain subjection without losing sight of their character, and without robbing them of their grace; in the latter work—and I am careful to speak of *late* Renaissance, as the early style has a beauty and delicacy all its own—we have the convention which has forgotten all about nature, or thinks to improve upon it, spinning ideas out of itself like a silkworm. It is almost unnecessary to say that with this exhaustive method the supply of ideas soon gives out, and we have strange and extravagant forms, at once luxuriant and weak in line, and poor in fancy—conventional indeed, and nothing besides. The deduction from this is, therefore, not to draw a line you do not understand and cannot explain to yourself. Be definite before everything—let every form you put on paper *be* something, explain something. Some of the natural forms most dear to the designer as models are so intricate that the explanatory and strictly conventional method is the only method of representing them at all. Look, for instance, at the numerous drawings by the ancient Egyptian artists of papyrus beds, executed with extreme simplicity, and almost amounting to mere shorthand notes of the real thing, but none the less beautiful in their way.

THE 1892 CERTIFICATE EXAMINATION.

BY DR. GEORGE BEACH, M.A.,

Co-Author of 'A Manual of our Mother Tongue,' 'A Girl's Arithmetic,' Author of 'Elements of English,' 'Entertaining Readers,' etc.

1. REMARKS ON THE ROUTINES:—

FIRST YEAR.

(*a*) Parse *these, it, to meet, Wizard, That, when, Him, listed, would, ring, Some, Warrior, say, that, three, But, were, having, but, thought, within, must, be done;* OR, *My, whole life, As, if, were, moved, come, unsought, still, rich, how, expect, that, should, who, no, all, thought, Soul, that, who, Following.* (First Friday.)

(*b*) Parse *to bury, That, therein, look, to tell, where, hid, Save, need, past, o'er, Again, to restore, one, red, wave, fiends;* OR, *Creatures, have heard, Ye, each, make, laugh, your, its, fullness, bliss, all, day, were, While, This, are culling, wide, flowers, while, warm, his.* (Third Monday.)

(*c*) Analyse from '*It was gravely said*' to '*There were no such things,*' and Parse *It, where, bare, that, like, astronomers, such, to save, though, were, no, things, like;* OR, Parse *summers, rolling, Once, behold, That, connect, is come, here, orchard-tufts, which, their, themselves, copses.* (Fourth Monday.)

(*d*) Paraphrase Essay IV. from '*The most tolerable sort of Revenge*' to '*the arrow that flieth in the dark*' OR, Lines 71 to 85 of '*Tintern Abbey.*' (Third Saturday.)

SECOND YEAR.

(*a*) Parse *O, sir, old, confine, be ruled, that, Better, than, you, yourself, Therefore, That, make, Ask, how, becomes, vouchsafe, me, food.* (First Wednesday).

(*b*) Parse *when, their, highness', Eve, risen, that, kneeling, came, Stewed, salutations, spite, Which, straight, meeting, Whose, mine, Being, late, Having, wit, drew.* (Fourth Monday.)

2. NOTES ON GRAMMAR.

(*a*) It is a common error when a Verb governs an Infinitive Gerund, as '*He attempted to fly,*' to place both the Verbs in the Predicate, whereas *to fly* should be in the Object. The rule is, that no Verb in the Infinitive should go in the Predicate, unless the preceding Verb is distinctly an Auxiliary.

(*b*) Infinitive Verbs are not pure Verbs. They are either Adjectives, Adverbs, or Nouns, according to the office they fulfil in the sentence, *e.g.*:—

'A proceeding *to be scorned.*' (Adj.)
'I come *to bury* Caesar.' (Adv.)
'He practised every pass and ward
To thrust, to strike, to feint, to guard.' (Nouns.)

Unless this be well understood, correct Analysis is impossible.

(*c*) Infinitive Verbs are seldom parsed fully. Below are specimens of the proper method:—

to be scorned	Verb, Regular, (Weak) Trans., Pass., Infin., used as an Adj. qualifying '*proceeding.*'
to bury	Verb, Regular, (Weak) Trans., Act., Infin., used as an Adv. of Purpose, modifying '*come.*'
to feint	Verb, Regular, (Weak) Intrans., Infin., used as a Gerund, governed by '*practised*' (or in apposition to '*pass*' and '*ward.*')

(*d*) Intransitive Verbs are often parsed as having *Voice.* This is incorrect.

(*e*) It is well to underline, and place in inverted commas the words of the passage that are quoted in the body of the Parsing. (See *c.*)

(*f*) Astonishing to relate, the Possessive signs of Nouns are often omitted or misplaced, especially in the Plural.

(*g*) The word '*as*' following its antecedents '*such,*' '*same*' is a Relative Pronoun. It is very frequently thus used by Shakespeare.

(*h*) The Adjective force of '*his*' is well shown by its being *modified* in the following sentence, '*It appall'ed* EVEN HIS *proud spirit.*'

Here the Adverb '*even*' modifies '*his.*' If '*his*' were merely a Pronoun it would be incapable of modification.

(*i*) The double offices of Relative Pronouns, Connective Adverbs, Participles, and Gerunds are often forgotten.

A Relative Pronoun both connects and is substantival.

A Connective Adverb both connects and is adverbial.

A Participle (especially in the Active Voice) is both verbal and adjectival.

A Gerund is both verbal and substantival.

(*j*) Note the following difficulties in Analysis:—

The Verb '*to be*' is not copulative when it means '*to exist,*' and in the latter instance it can form the Predicate by itself.

Sentences connected by '*where*' are often Adjective ones and not Adverbial, for '*where*' = '*in which.*'

Occasionally, especially in Middle English, '*which*' or '*who*' does not, strictly speaking, introduce an Adjective Sentence, *e.g.*—

'*He overtook James, who had previously departed.*'

The Sentence '*who had previously departed,*' although generally spoken of as Adjectival is more accurately a Principal Sentence, co-ordinate to '*He overtook James*'; for it does not really qualify, but rather expresses an additional assertion.

Mechanical directions for Analysing often mislead. For instance, the Conjunction '*that*' is often said to introduce invariably a Noun sentence. But the word '*that*' often means '*so that,*' and then the following sentence is Adverbial, *e.g.*—

'*I swore to bury his Mighty Book,*
THAT *therein mortal might never look.*'

The second sentence is here distinctly an Adverb.

(*k*) In several annotated editions of the Code, Wordsworth's '*Power of Sound*' is mentioned as one of the Poems for First Year Women. This is now incorrect, as '*Resolution and Independence*' has been substituted in the official copy of the Syllabus.

This circumstance accentuates our previous advice, *viz.*, that every candidate should secure from the Department the aforesaid official copy.

3. NOTES ON ALGEBRA.

(*a*) Second Year Ladies are strongly urged to take up this subject. One section of their Arithmetic paper will contain alternative questions on Elementary Algebra.

This knowledge will not only be also useful in furnishing the key to many difficult arithmetical problems, but will be serviceable for and preliminary to University examinations, and others, such as those of the Fröbel Society.

(*b*) Mistakes are sometimes made in Equations through dividing by a quantity that turns out to be equal to zero or nought.

The following is an amusing instance:—

$$\begin{aligned}
&\text{Let} && x = y\\
&\text{Then} && x^2 = xy\\
&\text{,,} && x^2 - y^2 = xy - y^2\\
&\text{,,} && \frac{x^2 - y^2}{x - y} = \frac{xy - y^2}{x - y}\\
&\text{,,} && x + y = y\\
&\text{,,} && 2y = y\\
&\text{,,} && 2 = 1
\end{aligned}$$

Which is absurd.

(*c*) Determine c and d so that in the product of $x^2 + x + 1$, and $x^3 + cx^2 + dx + e$, the coefficients of x^4 and x^3 may vanish.

$$\begin{array}{r}
x^3 + cx^2 + dx + e\\
x^2 + x + 1\\
\hline
x^3 + cx^2 + dx + e\\
x^4 + cx^3 + dx^2 + ex\\
x^5 + cx^4 + dx^3 + ex^2\\
\hline
x^5 + (c+1)x^4 + (c+d+1)x^3 + (c+d+e)x^2 + (d+e)x + e
\end{array}$$

Now by hypothesis $(c + 1) = 0$, $\therefore c = -1$
and $(c + d + 1) = 0$ $\therefore d = 0$

The result may easily be proved by substituting in the multiplier and multiplicand the obtained values of c and d.

(*d*) It is a mistake to commence the Binomial Theorem until Permutations and Combinations are thoroughly well understood.

(*e*) A question almost invariably asked is '*Prove the rule for finding the number of combinations of* N *different things taken* R *at a time.*'

4. PRINCIPAL AUTHORS FROM 1789 TO 1820.

(*a*) *First-rate.*—Burns, Wordsworth, Walter Scott, Coleridge, Southey, Campbell, Moore, Shelley, Robertson, Gibbon, Paley, Adam Smith, Jane Austen, Boswell, Charles Lamb.

(*b*) *Second-rate.*—Cowper, Darwin, Richard Brinsley Sheridan, Chatterton, Crabbe, Heber, Kirke White, Delolme, John Wesley, Adam Clarke, Gilbert White, Dugald Stewart, Sir Philip Francis (?) Maria Edgeworth, Jane Porter, Jeffrey.

(*c*) *Third-rate.*—Thomas Percy, Macpherson, Dibdin, James Montgomery, Horne Tooke, Cobbett.

Particularly note the 'Lake School of Poets,' Paley, Adam Smith, Chatterton, Gilbert White, Sir Philip Francis, Percy, Macpherson, Horne Tooke, and Cobbett on account of remarkable circumstances connected with their productions.

5. PRINCIPAL AUTHORS FROM 1603 TO 1702.

(*a*) *First-rate.*—Shakespeare, Milton, Dryden, Bunyan, Francis Bacon, Locke, Isaac Newton, Pope, De Foe, Addison.

(*b*) *Second-rate.*—Ben Jonson, Massinger, Herbert, Butler, Denham, Otway, Raleigh, Usher, Clarendon, Evelyn, Pepys, Burnet, Jeremy Taylor, Baxter, Hobbes, Congreve, Gay, Swift. Richardson, Steele, Tom Paine.

(*c*) *Third-rate.*—Drayton, Selden, Walton, Fuller, Isaac Watts, Young.

Of the less notable writers, Butler, Clarendon, Evelyn, Pepys, Hobbes, Walton, Steele, Paine, Swift, Richardson, demand special attention.

The translation of the Bible, which now constitutes our Authorised Version, and the rise of Newspapers must be studied.

6. LIVES OF PRINCIPAL STATESMEN, WARRIORS, ETC. (1789 to 1820).

First-rate.—Burke, Warren Hastings, Fox, Grattan, Pitt, Wilberforce, Canning, Wellington, Cook, Jervis, Nelson.

Second-rate.—Addington, Perceval, Abercromby, Cornwallis, Moore, Sir C. J. Napier Hood, Sidney Smith, Granville Sharp.

Third-rate.—Wolfe Tone, Joseph Lancaster.

7. LIVES OF PRINCIPAL STATESMEN, WARRIORS, ETC. (1603 to 1702).

First-rate.—Cromwell, Wentworth, Laud, Shaftesbury, Halifax, Montrose, Blake, Monk, Danby, Marlborough.

Second-rate.—Arabella Stuart, Pym, Vane, Clarendon, Algernon Sidney, Lord Russell, Temple, Ireton, Rupert, Fairfax, Lambert, Godolphin, Harley; Schomberg, Rooke, Torrington.

Third-rate.—Buckingham, Jeffreys, Sancroft, Shovel.

FIRST YEAR.

SECOND WEEK.

1. Write a Large hand copy of '*Analytical Chemistry.*'
Write a Small hand copy of '*Throw physic to the dogs.*'

2. Write from Dictation :—

'Religion exalts men because it connects them with God: and rulers least of all can afford to neglect anything which will make them more perfect. Especially is religion necessary in a democracy. The power of a people is greater than that of a monarch, and they are less controlled either by force or opinion. Only religion can keep them in mind of their responsibilities to their fellow men. When the State and its laws are invested with a sacred character, men will be more solicitous to bequeath them inviolate and intact to their successors.

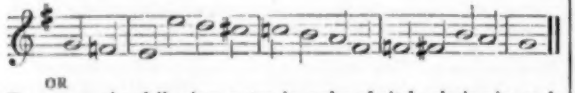
3. In what order should the mental faculties of children be called into exercise? Point out especially the objects which should be kept in view in the training of infants, as distinguished from elder children.

4. What is meant by the faculty of attention? How does it operate, and how far is its exercise an act of the will? Mention some devices by which a teacher can strengthen in his pupils the habit of close attention.

5. Write the supertonic of Key B♭, the subdominant of Key F, the dominant of Key A, the leading note of Key G, and the submediant or superdominant of Key D., OR Name the following intervals—

t	s	l	t	d'	f	f	l
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
r	t_1	r	f	m	t_1	r	fe.

6. Transpose the following a minor second higher, viz., into the Key of A♭.



OR

Rearrange the following notes in order of pitch, placing in each case the lowest note first :—

(*a*) s d_1 m r' t_1 fe d s_1 ta_1 l_1 r

(*b*) ta_1 m r' f t_1 fe l d m s l_1

7. Write an essay upon the characteristics of Scott's *or* Wordsworth's poems.

8. (*Women only.*) Analyse, and parse the italicised words of the following :—

There was a *time when* meadow, grove, and stream,
The earth, and *every* common *sight*
To me *did seem*
Apparelled in celestial light
The glory and the *freshness* of a dream.
It is *not* now *as* it *hath been* of yore :—
Turn whersoe'er I may,
By night or day
The *things which* I have seen, I now *can see no more.*

(*Men only.*) *It* appeareth in nothing more, *that* Atheism is *rather* in the lip *than* in the heart of man, *than* by this, that Atheists *will* ever *be talking* of that their opinion, *as if* they fainted in it within themselves, and would *be glad to be strengthened* by the consent of others.

9. What are the principal ways in which mountains affect the climate of a country?

10. Draw a map of the Midland Counties, OR of Natal.

11. Describe the Punjaub, OR the course of the Suez Canal.

12. What advances in colonisation did the British make in the seventeenth century?

13. What do you know of Odo of Bayeux, William Fitz-Osbert, Roger Bacon, Jack Straw, Campeggio, and Schomberg?

14. If I transfer £1,000 from 3 per cent. stock at 92 to a 4 per cent. stock, and gain £1 5s. in income, find the price of the latter stock. Ans. £117½.

15. If a piece of silk cost £15 15s. 2½d., and the number of yards in its length is the same as the number of pence in the cost of a yard, what is the length and the price per yard?
Ans. 61½ yards; 5s. 1½d.

16. (*Men only.*) The radius of a circle is 10 inches, and the angle subtended by an arc at the centre is 72°. Find the length of the arc. Ans. 12·5664 inches.

(*Women only.*) Cut out in paper, and make up one leg of a pair of drawers for a child of from three to five years of age.

17. (*Men only.*) Find the radius of a circle such that the area of a segment corresponding to an angle of 90° may be 50 square feet.
Ans. 13·236 feet.

(*Women only.*) A field of grass is rented by two persons for £27; one keeps in it 15 oxen for ten weeks, and the other 49 sheep for 7 weeks. What rent must each pay if 7 sheep eat as much as 3 oxen? Ans. £13$\frac{7}{11}$; £13$\frac{4}{11}$.

18. (*Men only.*) Solve $x^2 + \sqrt{x^2 + 3x + 7} = 23 - 3x$.
Ans. $3, -6, -\frac{1}{2} + \frac{1}{2}\sqrt{125}$.

(*Women only.*) Distinguish the different materials used for clothing as conductors or non-conductors of heat.

19. (*Men only.*) A boat's crew can row 8 miles an hour in still water. What is the speed of a river's current if it take them 2 hours and 40 minutes to row 8 miles up and 8 miles down?
Ans. 4 miles per hour.

20. (*Men only.*) Equal triangles upon the same base and upon the same side of it are between the same parallels. Bisect a given triangle by a straight line drawn from a given point in one of its sides.

(*Women only.*) Give some hints as to a Pupil-Teacher on the subject of cheap clothing, with reference to wear and cleansing.

21. (*Men only.*) Show that the propositions 2 and 3 of the Second Book are special cases of Proposition 1. What are the corresponding algebraical formulæ for these three propositions?

FOURTH WEEK.

1. Write a Large hand copy of '*Hydrocephalous.*'
Write a Small hand copy of '*Pacing with leisured step the flowery meads.*'

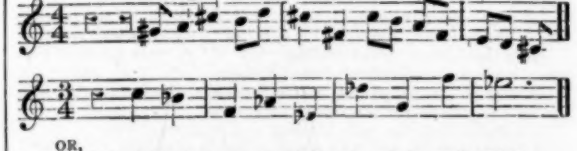
2. Write from Dictation :—

'When the phenomena of primitive societies emerge into light, it seems impossible to dispute a proposition which the jurists of the seventeenth century considered doubtful—that intestate succession is a more ancient institution than testamentary succession. As soon as this is settled a question of much interest suggests itself—how, and under what conditions were the directions of a will allowed to regulate the devolution of authority, and consequently the posthumous distribution of property.'

3. What are the Class Subjects recognised in the Education Code? State what are the exact requirements for any two of them in Standards IV. and V.

4. Write full Notes of a Lesson on one of these subjects, '*The Art of Printing*,' OR (for infants) '*The parts of a house.*'

5. In what major key are the following passages?



OR,

Which of the following notes is highest in pitch, and which lowest :—

(*a*) t_1 in Key C; (*b*) l_1 in Key B♭; (*c*) m_1 in Key A♭; (*d*) r_1 in Key D; (*e*) f in Key B.

6. Write rests equal in value to each of the following notes. Do not dot the rests, but write supplementary rests equal to the dots.

OR,

State the major scale relation (as subdominant, etc.) of the following tones :—

(*a*) **s** (*b*) **d'** (*c*) **f** (*d*) **r** (*e*) **t**.

7. Point out and give the force of the suffixes and affixes in the following words :—*melodious, weanling, surmise, hapless, uncouth, dialogue, discommodities, rhetorician dampishnesse, cabinet.*

8. Give a brief analysis of the essay on '*Vicissitude of Things*,' OR, Write out any passages in the '*Ode to Duty*' that recall the poets Gray or Kirke White.

9. Show how the path of the inferior planets appears at times to be retrograde.

10. Draw a map of the Nile, OR, New Zealand.

11. '*The first settlements of the English in India were at Surat, Fort St. George, and Bombay; the first provinces conquered were Bengal, Behar, and Oressa.*' Say briefly what you know about each of these towns and divisions, OR,

Describe the climate of the West African Settlements. Name their chief articles of trade, and describe their means of communication with the interior of Africa.

12. Show that the Feudal system existed in England before the Norman Conquest. How was it modified by William I.?

13. Give some account of the relations between England and Holland in the reign of Charles II., OR,

Write a short account of *four* of the following :—Warren Hastings, Sir F. Drake, Anselm, Stephen Langton, Earl of Strafford, George I.

14. (*Men only.*) Find the square root of
$x^4 - 2(p-q)x^3 + (p^2 - 2pq + 3q^2)x^2 - 2(p-q)q^2x + q^4$.
Ans. $x^2 - x(p-q) + q^2$.

(*Women only.*) State clearly the difference between hemming and seaming; and write down rules for the following: (*a*) to make a button-hole, and (*b*) to herring-bone a flannel.

15. (*Men only.*) A manufacturer sells goods at a profit of 25 per cent. on his outlay. By doubling his outlay he produces twice as much, but owing to a fall in prices he realises the same actual profit as before. Find the reduction per cent. in price.
Ans. 10 per cent.

(*Women only.*) '*Nothing is easier than so to mend a hole in a stocking, as that two or more holes are formed in its stead.*'

Show the truth of this assertion, and explain clearly the remedy.

16. Show that the amount of £700 at 10 per cent. per annum compound interest will in eight years exceed the amount of £1,000 at p.c. simple interest. Ans. By £80·014767.

17. (*Men only.*) The area of a circle is equal to that of a triangle whose base is 800 feet and altitude 256 feet. Find its circumference. Ans. 1134·4 ft.

(*Women only.*) Explain the difference between *abstract* and *concrete* numbers, and show by illustrations, under what circumstances, the quotient of a division sum will be an *abstract*, and under what circumstances a *concrete* number.

18. (*Men only.*) To construct a right-angled triangle, having given one side and the sum of the other side and the hypothenuse.

(*Women only.*) Write out rules for (*a*) plain darning a stocking; (*b*) fine drawing a rent in a piece of flannel, and (*c*) one method of putting a patch into a piece of linen.

19. (*Men only.*) The straight lines which bisect the angles of a triangle meet at the same point.

(*Women only.*) Describe the difference between carbonaceous, nitrogenous, and mineral food. Give examples in each class.

SECOND YEAR.

Second Week.

1. As in First Year.

2. As in First Year.

3. What are the processes of thought involved in (*a*) the classification of objects; (*b*) the use of an abstract noun; and (*c*) the use of a syllogism?

4. Give some examples of false induction, and say what kind of school exercises are best calculated to encourage the habit of making a true use of the inductive method.

5. As in First Year.

6. As in First Year.

7. (*Men only.*) What, according to Bacon, are the four chief vices of authority? Explain the following :— (*a*) As there are mountebanks for the natural body, so there are mountebanks for the politic body; (*b*) Revenge is a kind of wild justice; (*c*) The advantages of simulation and dissimulation are three; (*d*) Generally it is good to commit the beginnings of all great actions to Argus with his hundred eyes, and the ends to Briareus with his hundred hands.

(*Women only.*) What argument does Trench found upon the derivation of the word 'king'?

Account for *father, house, plough, cow, being Saxon; sovereign, veil, chivalry, being Norman; cypher, algebra, nadir, being Arabic.*

8. Paraphrase :—Lines 28-44 of Scene 1, Act I., *King Lear.*

9. (*Men only.*) As in First Year.

(*Women only.*) Describe briefly the Mountain System of Canada.

10. (*Men only.*) As in First Year.

(*Women only.*) Outline the system of Government in Canada. What is its position with regard to the Mother Country?

11. (*Men only.*) As in First Year.

(*Women only.*) What State Trials were of importance between 1789 and 1820?

12. (*Men only.*) As in First Year.

(*Women only.*) Mention some of the most remarkable discoveries, inventions and developments of industry between 1789 and 1820.

13. (*Men only.*) (*a*) Explain the reason for marking off *pairs* of figures in finding the square root of a number.

(*b*) Find the square root of 9064314·49. Ans. 3010·7.

(*c*) Find the square root of $x^2 - (a+b)x + \frac{a}{2}\left(\frac{a}{2}+b\right) + \frac{b^2}{4}$.
Ans. $2x - \frac{a+b}{2}$.

(*Women only.*) Draw a diagram on sectional paper of a woman's nightdress.

14. (*Men only.*) Solve the equations :—

(*a*) $x^4 - 5x^2 + 4 = 0$. Ans. ± 1 and ± 2.

(*b*)
$$\left.\begin{aligned} \frac{y}{x} + \frac{1}{xy} &= \frac{20}{3} \\ xy + \frac{x}{y} &= \frac{5}{3} \end{aligned}\right\}$$
Ans. $\pm\frac{1}{3}, \pm 3$; $\pm 1, \pm 1$.

(*Women only.*) Cut out in paper the left half of a boy's shirt.

15. (*Men only.*) The height of a cylinder is 4 feet 9 inches, the radius of the base is 4 feet 3 inches. Find the length of a cube of equal volume. Ans. 6·46 feet.

(*Women only.*) As in First Year.

16. (*Men only.*) Find the volume of a pyramid which stands on a square base, each side of which is 200 feet long, and each of the edges, which meet at the vertex, being 150 feet long.
Ans. 666,666·6 cub. feet.

(*Women only.*) A sovereign is worth 4 dollars 7 cents in American, and 25 francs 2 centimes in French money. How many cents will a man lose who charges £15 for 375 francs? (100 centimes = 1 franc; 100 cents = 1 dollar.) Ans. $4\frac{467}{471}$ cents.

17. (*Men only.*) A B C D is a quadrilateral of which the interior angles at A and B are together equal to two right angles. Show that the centres of the four circles described so as to touch internally three of the sides of the quadrilateral lie on a circle. Find its centre.

(*Women only.*) Describe with exact statements of time and quantity the processes of roasting, boiling, and stewing any piece of beef you choose.

18. (*Men only.*) In equal circles, equal angles stand on equal arcs, whether they be at the centre or the circumference.

Two equal circles intersect, so that the distance of their centres is equal to the radius of either of them. Compare the two arcs into which each circle is divided.

(*Women only.*) If you were hiring a house, what points affecting health would you inquire into?

Fourth Week.

1. As in First Year.

2. As in First Year.

3. What do you mean by the *converse* of a proposition? Give some examples. Are there any cases in which the *converse* is necessarily true?

CERTIFICATE ROUTINE FOR APRIL, 1892 (MEN AND WOMEN, FIRST YEAR).

DAYS	FIRST WEEK.			SECOND WEEK.			THIRD WEEK.			FOURTH WEEK.		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	Training of the Ear	Read 'Lay of Last Minstrel,' Canto II., *or* 'Resolution and Independence'	Euclid, Book III., Props. 24 to 31, *or* Repairing Underclothing	General Principles of Teaching	Study the Notes of 'Lay of Last Minstrel,' *or* 'Resolution and Independence'	Euclid, Book III., Props. 32 to 37, *or* Paper Pattern of an Infant's Shirt	Cultivation of the Intelligence	Analyse Lines 160 to 171 of 'Lay of Last Minstrel,' Canto II., *or* Lines 36 to 49 of 'Ode on Immortality.' Parse difficult words	Euclid, Book III., Props. 1 to 7, *or* Any Needlework	Training of the Voice	Analyse and Parse from Essay XVII., *or* Lines 1 to 14 of 'Tintern Abbey'	Euclid, Book II., *or* Organs of Respiration
TUESDAY	Chief Dates from 1461 to 1503	Simultaneous Quadratics, *or* Functions of Food	Geography of British East Africa	Chief Dates from 1503 to 1553	Algebraic Factors, *or* Materials and Cost of Clothing	Causes which affect climate	Wars with France from 1066 to 1461	L.C.M. and G.C.M. of Algebra — Construction of the Home	Political Geography of Hindostan, *or* Political Geography of Africa	Chief Dates from 1553 to 1603	Arithmetical and Geometrical Progressions, *or* Composition and Uses of Fresh Air	Distribution of Plants
WEDNESDAY	Compound Interest	History from 1461 to 1503	Any Arithmetic	Stocks	Any Revision	Mixtures, *or* Theory of Interest	Stocks, *or* Simple Proportion	Any Revision, *or* pp. 60 to 90 'Burke's Reflections'	Clock Sums	Equation of Payments, *or* Stocks	Any Revision, *or* 'Burke's Reflections'	Geography of Hindostan, *or* Egypt
THURSDAY	History from 1624 to 1642, *or* Wars with Scotland from 1066 to 1461	Simultaneous Quadratics, *or* Organs of Mastication and Digestion	Political Map of England, *or* Map of Egypt	History from 1503 to 1553	Simultaneous Simple Equations *or* Care, Cleansing and Use of Clothing	Effects of Climate on Industry and Productions	Ecclesiastical Affairs from 1066 to 1553	Algebraic Surds, *or* Furnishing of the Home	Map of New Zealand *or* of Cape Colony	History from 1553 to 1603	Harmonical Progression, *or* Ventilation	Sequence of Intellectual Development
FRIDAY	Notes of a Writing Lesson to Standard II.	Deductions on Euclid, Book I., *or* Diagram of an Infant's Shirt	Analyse lines 137 to 149 of Canto II., 'Lay of Last Minstrel,' *or* Lines 36 to 47 of 'Resolution and Independence.' Parse difficult words	Exchange *or* Theory of Proportion	Study the Antitheta of Bacon's Essays, *or* The chief aims of Wordsworth's Poetry	How to Teach Spelling	Present Worth, *or* Simple Proportion	Deductions on Euclid, Book II., *or* Study of Prosody	Write Notes of a Lesson as for Standard VII. upon the lines set for Monday's Analysis	Averages	Deductions on Euclid, Book III., *or* Answering Needlework Questions	Read 'Lay of Last Minstrel,' Canto III., *or* pp. 90 to 120 of 'Burke's Reflections'

SATURDAY																
	Music, Relations as Denoted by Tonic, Dominant, etc.	Science	Drawing	English Composition, 'The Life of Bacon or Wordsworth'	Music, Transposition from one Key to another	Science	Drawing	Repetition, Literature, and Penmanship	Musical Accidentals	Science	Drawing	Paraphrasing (see Article)	Musical Terms in Common Use	Science	Drawing	Repetition, Literature, and Penmanship

CERTIFICATE ROUTINE FOR APRIL, 1892 (MEN AND WOMEN, SECOND YEAR).

DAYS	FIRST WEEK.			SECOND WEEK.			THIRD WEEK.			FOURTH WEEK.		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	Summary Register and How to keep it	Read 'King Lear,' Act I., Scenes 4 and 5, and Act II., Scenes 1 and 2.	Revise Euclid, Book I. *or* Print Patch	Warming, Colouring, and Lighting of School Premises	Read Cantos III. and IV. of 'Last Minstrel,' *or* Trench Lecture, VI.	Revise Euclid, Book II. *or* Diagram of a Boy's Shirt	Notes of a Dictation Lesson to Standard VI.	Paraphrase Lines 1 to 16 of 'King Lear' Act II., Scene 3	Revise first 20 Props. of Euclid, Book III. *or* Linen Patch	Organisation of Mixed and Half-time Schools	Analyse lines 26 to 41 of 'King Lear,' Act II., Scene 4. Parse difficult words	Euclid Book III. Props. 21 to 37 *or* Any Revision
TUESDAY	Chief Dates from 1399 to 1478 *or* History from 1789 to 1802	Insurance	As in First Year — Geography of Quebec and Ontario	History from 1660 to 1688 *or* From 1808 to 1815	Stocks	As in First Year — General Political Geography of United States	Chief Dates from 1478 to 1527 *or* Colonial Enterprise from 1789 to 1820	Discount	As in First Year — General Political Geography of United States	History from 1688 to 1702 *or* Irish Affairs from 1789 to 1820	Ratio and Proportion	As in First Year — Geography of Manitoba and N. W. Territories
WEDNESDAY	Analyse Lines 141-152 of 'King Lear,' Act II., Scene 4, and Parse difficult words	Problems leading to Quadratics *or* Choice of Food	Jevons' Logic pages 7-22	Read 'Bacon's Essays' 14, 15, 16 *or* Notes on 'King Lear'	The Health of Scholars and Teachers	Permutations — Food for the Sick	Mensuration *or* Any Revision	Combinations *or* Investments	Pp. 22-41 of Spencer *or* Sections 157 to 168 of Locke	The Admission Register, and How to keep it	Permutations and Combinations *or* Investments	Any Geography
THURSDAY	History from 1509 to 1553 *or* History from 1802 to 1808	Stocks	As in First Year — Map of Quebec	History from 1553 to 1603 *or* From 1815 to 1820	Race Problems	As in First Year — Geography of Nova Scotia and New Brunswick	History from 1603 to 1649 *or* Indian History from 1789 to 1820	Stocks	As in First Year — Map of Ontario	History from 1649 to 1688 *or* Scotch Affairs from 1789 to 1820	Compound Interest	As in First Year — Geography of British Columbia and Vancouver's Island
FRIDAY	Problems in Simultaneous Quadratics *or* Beverages for the Sick	Euclid, Book IV., first 10 Props. *or* Diagram of a Boy's Shirt	Formation of Habits and Character	Permutations — Cooking Ordinary Flesh Meat	Euclid, Book IV. *or* Cutting out in Paper of a Boy's Shirt	Mensuration *or* Any Revision	Permutations and Combinations *or* Duties of a Housemaid	Definitions of Euclid, Book V. *or* Diagram of a Child's Muslin Pinafore	Read 'Bacon's Essays,' 17, 18, 19 *or* Lecture VI. of Trench's 'Study of Words'	Surds *or* Economy of Food	Euclid, Book IV. and Definitions of V. *or* Diagram of a Child's Muslin Pinafore	Paraphrase Lines 215 to 228 of 'King Lear,' Act II., Scene 4
SATURDAY	Music	Science	Drawing	English Composition upon the characters of Goneril and Regan	Music	Science	Drawing	Repetition Literature and Penmanship	Music	Science	Drawing	English Composition upon the character of 'The Fool'	Music	Science	Drawing	Repetition Literature and Penmanship

4. What is meant by *Induction?* Sketch out a Lesson in which the *inductive* method is employed, taking *one* of these subjects :—(*a*) Passive Verbs, (*b*) The properties of water, (*c*) Climate.

5. As in First Year.

6. As in First Year.

7. (*Men only.*) Analyse Lines 94 to 107 of Canto I. of '*Lay of Last Minstrel*,' and parse the following words :—*All, hung, slaughtered, grief, supplied, for, their, nor, had stood, when, purple.*

(*Women only.*) Analyse Lines 13 to 22 of Scene 3, Act. I., *King Lear*, and parse the following words :—*Put, on, what, fellows, come, lot, whose, mine, one, to be over-ruled, man, still, manage, that, away, as, flatteries.*

8. Mention any anachronisms in *King Lear.*

9. (*Men only.*) As in First Year.

(*Women only.*) Draw a Map of Queensland.

10. (*Men only.*) As in First Year.

(*Women only.*) Name the chief seaports of the United States, with the State to which each belongs, and the nations by which those States were originally colonised.

11. (*Men only.*) As in First Year.

(*Women only.*) Describe briefly the campaign of Waterloo. Draw a plan of that battlefield.

12. (*Men only.*) As in First Year.

(*Women only.*) Give some account of the '*Orders in Council.*' Explain the purposes for which they were issued, and the circumstances of their repeal.

13. (*Men only.*) Enunciate (*not prove*) the Binomial Theorem, giving the rules for the signs, co-efficients, powers, and number of terms of a positive index.

(*Women only.*) Write a brief life of the younger Pitt.

14. (*Men only.*) How many different numbers can be formed by using one or more of the figures 1, 2, 3, 4, 5? Ans. 120.

(*Women only.*) Write down the measurements of a shirt for a boy 12 years old.

15. (*Men only.*) If a sphere of lead, 4 inches in diameter, weighs 221·3 ounces, find the weight of a sphere of lead 5 inches in diameter. Ans. 432·227 ounces.

(*Women only.*) As in First Year.

16. (*Men only.*) Find the length of a cube which shall be equivalent in volume to a sphere 20 inches in diameter.
Ans. 16·12 inches.

(*Women only.*) As in First Year.

17. (*Men only*) What are the three main steps in the Demonstration of Euclid IV. 10? PQR is such a triangle; the base angles are bisected by QST, RSV, which meet the circle described about the triangle at T and V respectively. Show that the figure PTSV is a rhombus.

(*Women only.*) Mention the common defects in house-drainage in (*a*) towns (*b*) the country. What ill effects will arise where a house is not effectually drained?

18. (*Men only.*) As in First Year.

(*Women only.*) Explain the qualities and uses of (*a*) borax, (*b*) soda, (*c*) ox gall, (*d*) chloride of lime.

The names of any Certificate Candidates, not being students in any Training College, must be notified to the Education Department not later than the 1st of October.

Every Acting Teacher should see that his name is inserted in the Annual Return (Form IX.) Table XVII., followed by the words 'Christmas Examination, First or Second Year Papers' as the case may be.

All Students should procure Brook's Geography. There is none published so completely on the lines of the Scholarship and Certificate Examinations, or with the facts and figures more up to date.

CORRESPONDENCE.

We shall be pleased to reply briefly and through these columns to anyone seeking examinational information and advice.

This privilege does not, of course, extend to furnishing the solutions and answers of problems. All such communications should be addressed to 'THE QUERY EDITOR.'

Replies demanding urgency will be promptly forwarded per post on receipt of a stamped and addressed envelope. A post will be saved by writing direct to DR. GEORGE BEACH, M.A. *(Examination Editor of Practical Teacher)*, STANLEY MOUNT, MACCLESFIELD.

A. P. B. (Malpas).—We cannot undertake the responsibility of advising.

U. S. (Coombe).—Advertise in the *Schoolmaster.*

F. I. F. (Wearmouth),—Separate lists for Students and Acting Teachers.

R. W. H. (Leicester).—Send in your name to the local centre before the 20th inst.

N. W. (Canterbury).—You are right. We consider it almost dishonourable for any Teacher to remain outside the Union. See 'Well-known Teachers at Work.'

W. B. D. (Stockport).—You have one more chance only.

P. P. D. (Burslem).—No. First and Second Divisions only.

J. F. (Leeds).—The Department will not recognise Agriculture as a suitable specific for a town school.

W. C. (Nottingham).—Your request is complied with this month.

S. S. A. (Brighton).—Many thanks for information and congratulations.

'W.' (Erdington).—We are sorry, but cannot add more.

B. A. (Saltaire).—'Education and Heredity,' published by Walter Scott in 'the Contemporary Science Series.'

LORNA (Holmsdale).—You will get the 'Teacher's Drawing Certificate' for your *four* subjects by applying to South Kensington.

P. J. M. (Dudley).—The Department will recognise the Central System of P. T. instruction for teachers in *Voluntary* schools.

A. G. (Stornoway).—We regret, but the limits of our space prevent us supplying the information. It would take a page, and the portion relating to Chile will not be asked for.

T. W. (Denbigh).—About 80 per cent.; the joins of the letters are slightly defective.

L. D. (Windermere).—We answered your letter at once.

S. N. S. (Windsor).—La Jeune Sibérienne, Pitt Press.

C. M. (Burnfield).—She may assist you, but cannot take charge. You should be present.

D. S. (Worcester).—We know of no book of the kind. There would be few purchasers.

T. L. E. (Bedford).—See the chess column in the *Schoolmaster.*

J. D. H. (Pensarn), N. P. (Llansamlet).—The marks are generally carried forward, but you should communicate with H. M. Inspector.

S. S. F. (Swansea).—A full account of the M. S. Scholarship book is given.

ASPIRANT (PORTSMOUTH).—It will be best to apply direct to the Secretary of C. O. P.; we are unable to decide.

T. G. K. (Chelmsford).—McGee's, Nassau Street, Dublin.

A. M. (Manchester).—We have handed over your letter to one of the staff, who doubtless has replied ere this.

J. B. (Staleybridge).—See answer to R. W. H.

S. J. Q. T. (Plymouth).—Bohn's Translations or Kelley's Keys to the Classics.

RITA (————).—You can sit again we believe; but apply to Education Department.

G. C. (Alnwick).—You can deduct the polling days from the 400.

L. E. (Rhylen).—Your predecessor takes three-quarters of the Grant.

L. E. (Stourbridge).—Professor Brown, Syndicate Buildings, Cambridge.

M. M. (Rochdale).—By all means enter a Training College,

'9' (Evesham).—Your absence will count as a failure.

B. J. (Ashbourne).—It has been done.

'JONAS' (Douglas).—'*With*' governs '*spear*'; '*only*' mod. '*were.*'

R. S. G. (Liverpool).—The Secretary, Education Department, Whitehall, London; and to the Training College.

'ELLEN' (Grantham).—Combinations not Permutations.

H. L. (Wellington).—We know of no translation to '*La Directoire.*'

SOUND (York T. C.).—Two elementaries count as one advanced.

T. H. H. (St. Austell).—We are greatly obliged for the correction to equation (No. 16*a*), Second Week of March.

'PSYCHE' (Brecon).—Get your indentures extended. (Art. 41*f.*)

W. R. (Scalloway, Shetland).—'*Where those immortal shapes, etc.*' Adjective sentence to '*court.*' Your analysis is correct in every particular. The passage is difficult.

MR. W. M. MORGAN, Oxford Street, Griffithstown, Newport, Monmouth, offers a shilling for THE PRACTICAL TEACHER of September, 1891.

ANSWERED BY ORDINARY LETTER.

H. E. H. (Whitehaven), R. W. H. (Congleton), S. M. (Sandbach), P. R. (Moxton), A. C. P. (Pedmore), HEREWARD (Totnes), C. W. (Bardon Hill), M. R. (Langley), J. S. (Tranmere), W. H. (Soho, Birmingham), R. M. (Congleton), STONE (Crewe), 'F.' (Reddish), T. H. (Bredbury), A. B. (Shipley), WHEEL (Barrow), A. P. (Leycett), W. V. (Donnington), J. M. P. (Longton), S. R. (Shrewsbury), C. J. L. (Radstock), J. T. C. (Fence Houses), 'M. or N.' (Warrington T. C.), E. P. (Lewes), F. R. P. (Cork), W. W. (Fisherton), J. B. (Kettering), P. D. (Manchester), P. N. (Pontypridd), G. R. L. (Chelsea T. C.), G. S. (Moreton-in-Marsh), S. G. (Leytonstow), DONE (Limerick), B. J. (Barnsley), A. S. H. (Ilford), H. D. J. (Southsea), DELORAINE (Berwick), T. B. (Manchester), E. L. (Bromsgrove), MAN (——), J. T. E. (Aberayron), S. L. (St. Heliers), — (Exeter), M. C. T. (Newport), C. J. (Dundee), J. L. (St. Leonards-on-Sea), G. B. (Didsbury), 'Rob' (Tetenhall).

ELEMENTARY LESSONS IN AGRICULTURE.

BY PROF. GREEN,

Examiner in Botany to the University of Cambridge.

X.

MANURES.—(*Continued.*)

WE have next to take into consideration another class of substances used as manure. The fertilisers belonging to this class differ from the last which we discussed in this respect—instead of containing all the substances which the crop requires, they only contain one, two, or more of them. They are, therefore, not such as can be used indiscriminately for all crops, but are only available in special cases. Thus some of them are of great assistance to such a plant as wheat, while others, though of no great use to wheat, may offer great help to root crops, and so on. These are often known as *special* manures.

There are different circumstances which call for the employment of fertilisers of this class, and these must be carefully borne in mind, and the necessary manure only supplied, or no good will result. It may happen that from long-continued cultivation of particular crops the soil becomes exhausted of some particular constituent, without which those crops cannot thrive. The soil may still contain all the other substances the plant wants, but one being lacking these cannot be taken advantage of. In such a case a special manure should be used, supplying in particular this missing ingredient. Very often land is poor in lime, or in potash, or in phosphorus, though otherwise it may be in good order.

A special manure again must be used when some crop is to be raised which needs some particular substance which the ordinary soil does not contain.

Besides these occasions special manures are sometimes needed, not so much to supply particular nourishment to the plant, as to enable it to make use of what is already in the soil. These act not so much as foods as stimulants, which cause a great growth of the plants, by enabling them to use other substances in greater amount than they otherwise would. These differ thus very markedly in their action from the manures we have hitherto considered, for they do not supply the soil with much material, while they excite the plant to draw from it very much more than it otherwise would. In other words, they tend to exhaust the soil, and they cannot therefore be used year after year upon the same fields, as farm-yard manure can. When employed frequently they are generally used with other manures, which restore to the soil what the plant has removed. In this case we see that the farmer supplies his crop with both food and stimulant.

In using manures of this second class considerable care must be exercised. A field may in one year profit very greatly from a dressing of lime. It does not at all follow that a repetition of this treatment the next year will be attended with good results. The field at the outset was probably deficient in lime, and on its being added the crop soon found all the constituents it needed. The next year, however, lime was already there from the preceding dressing, and there being no deficiency, addition of more lime would not help the crop at all. The treatment advisable is to ascertain, from time to time by actual analysis, what ingredients of the soil are becoming deficient, and to supply manures which contain these. If any one necessary food stuff is not offered to the crop in the soil, a superabundance of others will not be able at all to take its place, and the plant will, as it were, starve in the midst of plenty.

The first of these special manures we will notice is that which is especially noteworthy as containing phosphorus. There are many combinations used, but all agree in supplying this element in the form of some soluble salt of phosphoric acid. The term 'phosphates' is frequently employed in speaking of all these, and the phosphoric acid is most advantageously combined with calcium. The material from which it was first derived was the bones of animals, which were applied to the fields without any treatment, except that they were ground into pieces about half an inch to an inch across. They were spread chiefly over grass land, at the rate of about 30 cwt. to the acre. Under the influence of the weather they gradually decomposed and gave up to the land their phosphates little by little, thus materially improving the pasture.

We can easily understand why bones should be so advantageous to grass, for the crop removed year by year was taken off by the animals feeding upon it, and the food so taken contributed to form the substance of their bodies.

Raw bones contain on an average nearly half their weight of calcium phosphate. They contain also a very large amount of organic matter in the form of gelatin, which on decomposition yields a certain amount of nitrogenous matter to the soil.

It is not now usual to employ raw bones for this purpose. It has been found that though they contain a great percentage of phosphate of calcium this is not in a soluble form, and is therefore of but gradual use, as it has to be converted into the soluble form by chemical action in the soil. There is another compound of calcium and phosphoric acid which is very soluble, and which contains more phosphoric acid than the ordinary calcic phosphate of bones. It is on that account often described as 'superphosphate of calcium.' This can be prepared from the other form by action of sulphuric acid, and we find that in making most bone manures this treatment is adopted, and the manure contains this soluble form of phosphate instead of or in addition to the other. The value of the manure for immediate use depends largely on the proportion of superphosphate which it contains.

The superphosphate then used to be prepared exclusively from bones, and a good deal is still so made. The manure is generally known as *dissolved bones*. But within comparatively recent times another source of phosphate has been discovered. There are in the Eastern counties of England, buried but a little distance under the soil, beds of a curious mineral known as 'coprolites.' The mineral is found in the form of rounded masses looking much like coarse gravel stones in shape. These are believed by most geologists to be the fossil dung of extinct animals. On analysis they are found to contain a very large percentage of phosphate of calcium.

Besides these nodules, coprolites generally consist of fossils of various extinct animals, which are also very rich in phosphoric acid. These coprolites have given

rise to a considerable industry in various parts of Cambridgeshire and the other neighbouring counties. From the beds they are sent to the manure manufactories, and by a similar treatment to that used in the case of bones they are worked up into various artificial fertilisers, known as turnip manure, barley manure, etc., being used in different combinations according to the crop for which provision is being made.

Another mineral substance which we must notice as a special manure, often of very great utility, is *lime*, a combination of calcium, hydrogen, and oxygen. Instead of lime, chalk is sometimes employed, or a mixture known as marl, which contains clay as well as lime. Chalk differs from lime in containing carbon-dioxide. Lime is prepared by burning either chalk or limestone in a kiln, so as to drive off its water and carbonic acid. In this condition it contains no hydrogen, and may either be used as it is, or, before being applied to the soil, it may be treated with water, which combines with it, and reduces it to a fine powder. This is known as *slaked* lime, as distinguished from the other, which is called *caustic* or *quick* lime. Chalk is, on the whole, to be preferred to lime as a dressing, as its effects last longer, but very often the question of transport prevents it being used.

Lime is used with advantage on soils which are deficient in calcium, supplying such deficiency. It is often applied to stiff clay soils to improve their working. When harrowed into the earth it exerts very important influences upon it. It is a strongly alkaline body, and so combines with acid bodies in the soil which may have injured it for the crop. On a soil which is thus 'sour' we find the herbage is harsh and tough, and unpalatable to the animals, who prefer a more nutritious food. The application of lime to such a pasture will often change the character of the herbage entirely, quite different grasses establishing themselves and thriving, while the old ranker sorts die out and disappear.

Again, lime exercises an important influence on the clay of the soil, helping to form a class of bodies known as the soluble silicates, the presence of which in clay soils increases their fertility. When organic matter is abundant in the soil, caustic lime acting on this sets up a number of chemical changes, one of the results of which is the formation of nitrate of potash, which is a very valuable fertiliser, very little used on account of its relatively great cost. Indirectly we have the lime serving as a very valuable manure in the production of this body.

Caustic lime must be used with caution, on account of the property it has of destroying the organic matter in the soil. Some soils, especially those that contain large proportions of sand, and are known as 'light land,' cannot afford to lose their organic matter. The properties of humus in the soil we have already discussed, and we can see how injurious it is to the plant to have too little of it present.

Chalk is much milder in its action than caustic lime. It also has the power of neutralising the acids which give the soil its 'sour' character, and result in harsh wiry growth of herbage. It acts, however, much more gradually and gently, and can hence be employed on soils where caustic lime would be deleterious. It is generally used in larger quantities than lime, about 20 tons per acre being the usual application.

Chalk is very different in its behaviour to lime. The latter soon crumbles to powder under the influence of water, either before it is mixed with soil as slaked lime, or after such mixture, if applied in the caustic form. But chalk is not acted on in this way by water. It has therefore to be applied to the land in winter when it is fresh dug and before it has had time to become dry and hard. Under the action then of frost and thaw the chalk is made to fall to pieces in a powdery form.

Marls, which we have already said are mixtures containing clay and lime, are more complicated in their composition than either of the two we have considered. The proportion of lime in them varies very greatly, and they often contain, in addition, small quantities of phosphates, potash, and other fertilisers. Marls are generally used, however, not so much for these latter, as for their effect in altering the mechanical condition of the soil, being very valuable on light lands, where the soil contains too large a quantity of sand.

Another class of special manures is that in which salts of potash are a prominent constituent. Potassium in some form or other is necessary for a plant's well-being. If it be absent from the soil the plant makes no progress in its growth, but remains stunted and bears but a few leaves. The potassium can be supplied in various forms of combination, as carbonate, or sulphate, or chloride. The plant seems to thrive best when it can absorb it in the last named form.

When we look specially at the crops of the farm and examine the ash left when they are burnt we find evidence of its importance. The ashes contain all the mineral elements which the plants have absorbed during their life. When wheat is so treated, next in amount to oxide of phosphorus comes potash, while in the ash of beans, turnips and potatoes it is the largest in quantity. It is also very prominent in the ash of hay and straw.

There is not, however, yet so much demand for potash as there is for manure containing phosphates. To see why, we must recall the fact that it is only when a substance is present in a soil in too small an amount that an application of it is advantageous. Now, potash is in most soils present in sufficient quantity to supply what the crops require, and till this store is exhausted addition of more in any form would be superfluous. The employment of farmyard manure economises the potash already in the soil, for we have seen that it contains a quantity of straw, more or less decomposed, which thus restores some of the potash which the crop had taken from the field.

Artificial supplies of potash are now generally derived from Prussia, where about thirty years ago large beds of a kind of rock-salt were somewhat accidently discovered. This material is known in the markets as *kainit*, and from analysis it has been ascertained to contain nearly twenty-five per cent. of potassium sulphate. This discovery led to a great increase in the application of potash salts to the soil, for it can be purchased in the English market at about £4 per ton. Before the discovery the price was so high as to make it unremunerative to use it.

Ordinary salt (sodium chloride) is employed as a manure in certain cases. It is, however, only used for a few crops, and by itself it is of little value. Sodium

seems to be but of little use to plants, and the value of salt seems to consist in the decompositions it provokes in the soil. It is often used with the stimulating manures spoken of above, such as nitrate of soda or potash.

Other salts, such as sulphate of calcium (gypsum) and sulphate of magnesium are occasionally found useful.

Of the manures used more to stimulate the plant to use material already in the soil, the most important is nitrate of soda. Nitrate of potash was formerly employed, but it is very expensive, while the soda salt costs much less, ranging from £12 to £15 per ton. The latter is imported largely from South America, where it exists in great abundance. When judiciously employed it is a very valuable fertiliser. The crops to which it is usually applied are the grass crops, including the cereals. It stimulates these at once to great activity, and its beneficial effects can, consequently, soon be seen after application. It is applied usually as a top dressing when the plant has arrived at a fair degree of development. The effect is noticed chiefly upon the vegetative part of the plant, *i.e.*, the stems and leaves, making the crop of sturdy habit. It is said that when applied to wheat it so greatly strengthens the straw that the crop is seldom beaten down by heavy rains. At the same time it is not without influence on the grain, increasing the yield. This may be an indirect effect, because a strong, vigorous plant will be more likely to produce a good amount of seed than a weakly one. It must not be forgotten that its stimulating effect causes the plant to take much more out of the land than it otherwise would, and therefore when it is used it should be supplemented by a good supply of other fertilising material.

Other stimulating manures often employed are sulphate and chloride of ammonia, a copious source of which is the gas liquor produced in the manufacture of coal gas.

To recapitulate; we have seen—

1. That besides the general manures spoken of before, others are in general use which are useful only to particular crops and under special conditions. These are known as *special* manures.

2. They are of two kinds—those which supply special ingredients required by particular crops, or replacing only particular substances, of which the soil has become exhausted; and those which are used to stimulate the plants to avail themselves of substances already in the land.

3. These special manures may be divided further into classes according to the special ingredient that they supply. Of these we find (i) phosphates, derived either from bones or from deposits of phosphatic matter known as coprolites, and applied to the land either as calcic phosphate or calcic superphosphate, the latter being the most advantageous form; (ii) Lime, chalk or marl; (iii) Potash salts.

4. The stimulating manures are represented by such compounds as Nitrate of Soda. These tend to exhaust the materials already present in the soil, and must hence be used sparingly, or applied as a top dressing to a crop, which has previously been supplied with a considerable amount of fertilisers of the other class; either a general manure, such as farmyard manure, or a special manure adapted to the needs of the particular crop under cultivation.

NOTES AND NOTIONS.

BY T. J MACNAMARA.

IV.

THRICE only have we had a taste of Mr. Yoxall's quality in these columns, but of so excellent a brand has he drawn it that I cannot expect my appearance to be greeted with anything like effusion. Indeed, the task of penning these lines has constituted in itself a valuable experience. It has given me the simulacrum of a sensation of what an *impresario* feels like when he has to come to the front, and not only to stammer out impatiently-received apologies for the non-appearance of the pet *primo tenore* but to offer his own penny-trumpet waverings as an acceptable substitute for the clarion tones of the hero of the high C's. For this experience, much thanks.

* * * * *

AND now for Mr. Yoxall—the *beau sabreur* of Educational politics. It will be no news to the majority of my readers for me to announce, like a belated town-crier, that he is the accepted candidate in the Gladstonian interest for the Bassetlaw Division of Nottinghamshire. And need I tell the readers of THE PRACTICAL TEACHER that a very fine fight he will make of it, or assure him of their good wishes for his success?

Already his public utterances discover him to be in keen and earnest sympathy with the disabilities and hardships which make the lives of those who potter away life in the byeways of Arcadia sorely grievous to be borne. Everywhere he is arousing the greatest enthusiasm, except, of course, in the camp of his disconcerted opponent, Sir Frederick G. Milner, whose face, when he heard of the brilliant young Richmond who had taken the field against him, was doubtless, like the countenance of the hero of Ruddigore, 'a sight for to see!'

Whether as a result of the impending General Election or later, Mr. Yoxall is ultimately pretty sure to form the middle one of a party of three to advance with much circumstance to Mr. Speaker's Table, and is certain to 'make his mark' when he gets there!

* * * * * *

So please you, my purpose in these columns will be to take up the threads exactly where, and as, the Hon. the Candidate relinquished them. About this I have had some little heart-searching, since mine is rather of the heavy dragoon than the light cavalry touch, and I plead guilty to the tendency to trot out the steam-hammer on the slightest provocation—especially when there is the merest hazel nut to crack. Albeit, after consultation with the most eminent of the faculty, I have deemed it unwise to make any change in the sustenance of the three-month-old infant, of whom I now become the foster-parent. Will you my good reader come to my rescue and help in his upbringing?

Any good thing that may cross your track; instances of unconscious juvenile witticism; knotty Codal points awaiting disentanglement; and generally the latest ideas of minds perpetually ransacked for better scholastic methods; don't stand upon the order of sending, but send, and the superscription should be T. J. Macnamara, Montpelier, Bristol.

* * * * *

AFTER the 'Penny Dreadfuls' of hideous memory perhaps nothing is more calculated to upset the mental escapement of the larrikin than the appallingly

sanguinary placards which fling their hoarding horrors at the wayfarer of the public streets. I shut my eyes and call up the latest. It is a mighty chasm—highly varnished. Giant boulders, tremendous in their startling pigment-coats of green and yellow, bound on either side the boiling torrent of a blood-red stream that goes roaring and frothing far below. Spanning the awful gulf is a rude bridge, and above all the bluest of blue empyreans that ever sun shone out of. Half-way across the bridge, his eye rolling in fine transpontine frenzy, the hero of the situation stands, stricken with a truly tragic attitude. His sombrero has fallen off in the struggle, and his open vermilion shirt reveals a chest of Gargantuan proportions. Across his arm lies the fainting form of such a heroine as would have made the Gods of the Old Surrey yell again. Below them, hurtling through the air, and hissing execrations from a mouth as diabolical as ever Dante conceived, goes the 'villain of the piece' to his 'last long reckoning,' whilst sundry bowie knives are disporting themselves in mid air with the most delightful inconsideration for the law of gravitation. What it's all about I can only essay the wildest guess. Presumably the villain of the piece has been carrying off the gentle maiden—the pride of the country-side—and has got just as far as the primitive bridge when along comes her 'trew lovyer' and makes things hum!

All the personages are 'got up regardless,' as somebody says, and the pavement is never without its troop of youngsters paying tribute with open mouths and staring eyes to the hero's daring.

* * * * *

THERE was a Member of Parliament once whose peculiar crank it was to give notice, session by session, of a Bill to prohibit persons from cleaning upstair-windows from the outside, and this in order to save the necks of those on whom the window-cleaners might possibly drop. Most estimable man! Would that your like were with us now to put down by statutory enactment such depraved advertisements as daily ravish the eyes of the Board School gamins of our large centres.

* * * * *

HAVE you ever noticed—of course you have—how children will insist upon making 8 times 0 come to 8, 7 times 0 come to 7, and so on? This may be obviated by giving in your teaching each of the multiplication tables a 'baker's dozen' of lines beginning with $2 \times 0 = 0$, instead of $2 \times 1 = 2$ according to time-honoured custom. Do this with each table and there will be no more of 8 times 0 = 8.

* * * * *

I HAVE been reading recently an instructive and in some places, highly diverting pamphlet on 'Experiences and Impressions of English School Life' by Gymnasiallehrer Gustav Lenz. The writer, having been for five months an assistant master in an English Private School, essays to rebut some of the evidence given in an earlier pamphlet on the same subject by his compatriot, Herr H. Raydt. How near he gets to the truth the following excerpt must attest:—

'Any observant foreigner who has lived in England, even if only for a short time, must have been struck with the great self-consciousness of the Englishman, which quality is already developed in a high degree in the little boy. The Englishman is proud of his language, of his country, of its riches, and of its institutions. As a consequence it is a common fault with him to depreciate other nations and to overrate himself and his own people. To this national self-reliance he adds a great love of individual liberty and self-dependence. He will not under any circumstances be deprived of them, either by the State or by the Church, and he hates all bureaucratic ways, or, as he calls it, 'red tape business'. Then he possesses a profound respect for the Law and for the existing institutions of the State, as well as, in general, a true sense of religion, which sense is greatly fostered and enhanced by his family-life. Moreover, we find in the Englishman the singular inclination to ask first of all in everything he undertakes: "Of what use is it?" To this practical sense, the English partly owe their supremacy upon the seas, and we Germans, who have but a short time since begun to acquire colonies, may learn very much in this respect from the practical Englishman.'

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HERR LENZ is rough on the assistant master of the private school. Says he:—'Many assistant masters are indeed bad men, and a great number of them are drunkards. (!) In England, where a great spirit of caste prevails, even a shopkeeper will have nothing to do with an assistant master. A common shopkeeper, who was living opposite our school, thought he did me a great honour when at the end of the 'half' he at last condescended to converse with me, after I had always purchased my tobacco at his shop and vainly tried to enter into conversation with him.'

* * * * *

THEN our Pamphleteer goes on: 'The assistant master is indeed a poor creature worthy of pity. The future lies dark before him, he cannot enjoy the tranquility of a sweet home, he is continually tormented and teased by unruly boys, often illtreated by his Principal; even the lady of the house will look upon him very unkindly, whenever some boarders have not washed themselves nor combed their hair properly in the morning. He is the bottom-rung of the long ladder; at the top of which is the head master of a great Public School, such as Eton or Rugby.' You will be glad to know that he makes honourable exception of what he is pleased to style the 'Elementary Teacher' in connection with these strictures.

* * * * *

WHO says Chicago and the 'World's Fair' next year? All the world and his wife will be there no doubt, and the 'Amurkans' intend that their Exhibition shall be the grand finale of the century. Probably plenty of tours will be arranged, but of these more anon. Meanwhile, here are a few facts. The Exhibition grounds will cover 660 acres, or, roughly, an area equal to that of Hyde Park. The Paris Exhibition, by the way, covered 173 acres. The cost of providing the various buildings will be £1,500,000, and the great feature of the 'show' will be the Administration Building, which will surpass in architectural beauty the Capitol at Washington. Every corner of the globe will be placed under contribution and called upon to yield up its best of Industrial, Commercial, and Social Enterprise. Nothing that should find a place in a 'World's Fair' will be omitted even if the Yankees have to turn the globe inside out to find it.

* * * * *

TALKING about Chicago recalls a fact that should ever redound to the public spirit and enlightened notions of its citizens. *One half of its municipal*

budget is annually devoted to educational purposes! How's that for Progress? Compare it with the snuffling and grumbling with which a 'sixpenny' School Board precept is hailed in our large cities where the total rate amounts to more than as many shillings. Compare it with the estimate put upon the work of Education by a Devonshire School Board, which left its schoolroom unscrubbed for sixteen years because, forsooth, the scrubbing would entail an expenditure of Public money of Five shillings!

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HERE'S a curious table I compiled some time ago from Parliamentary returns. If it doesn't mean Local Control run mad I should like to hear of another interpretation :—

School Board	County	Population in Area of Administration	Average Attendance of children in the only School under the Board	Number of Members
Balking	Berks	169	26	5 + a pd. clerk
Hauxton	Cambridge.	232	26	5 „ „
Kirkland	Cumberland	175	22	5 + hon. clerk
Dunton	Essex	140	16	5 + a pd. clerk
North Fambridge	„	142	15	5 + hon. clerk
Peterstone.....	Monmouth.	156	18	5 + a pd. clerk
Car Colston	Nottingham	276	20	5 „ „
Cudworth	Somerset ...	140	22	5 „ „

I don't say anything about the sort of Educational Management these remote little villages can produce, but how atrociously absurd to elect a Board triennially to manage a little school with an average attendance of fifteen children! Three children to each Board member! When, oh when, will that abomination of all abominations—the Pettifogging School Board—be improved from off the face of the earth, and its place taken by thoroughly efficient District and Local Boards of Education?

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STRING the following words together into half-a-dozen pieces of 'unseen' dictation, and note how your Standard IV. will tackle them :—Catch, until, making, goes, those, village, safety, familiar, parliament, difference, separate, describe, destroy, government, truly, deceit, solemnly, design, fulfil, pleasant, present, judgment, purpose, pursuit, surface, vegetable, exciting, using, siege, quarrel, potato, doctor, descent, splendour, business, scourge, valour, necessity, necessary, develop, grammar, and occurring.

• • • • •

ISN'T it really about time the Government took the question of the qualification for exemption from school seriously in hand? Here is a district where a child can go to work full time at ten years of age, irrespective of any educational qualification whatever! In this village he has to pass the Third Standard, and of course be over ten years of age; in that it is the Fourth Standard. On this side of the street he scurries off when he has passed the Fifth Standard, and on that he must wait until he has reached the Sixth. Here is a mill in the middle of a potato field; in a few months *half time* in the mill will not be permissible until after the eleventh birthday. *Full time* in the potato field will still be possible twelve months earlier! Again, here is a factory and a coal mine side by side. *Full time* in the former commences at thirteen, in the latter at twelve! What price Mr. Gilbert for such topsy-turvydom as this? By all means away with the 'Standard' qualification for labour, and institute a system under which continuously regular attendance at school shall be the main consideration.

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THE old Parochial Schoolmasters of Scotland, be it known, have absolute fixity of tenure. They are as unremovable from their offices as limpets from their rocks—only more so. With the more recently appointed teachers it is different. They are secure in the tenure of their office only so long as they do their work properly. Members of the managing boards of Scotch schools have now and again detected a much more independent—not to say self-assertive spirit amongst the older pedagogues than is evinced by their younger colleagues. One Board member was intrepid enough to ask one of the old school why this difference of manner should be so marked. 'Well! You see,' said he of the fixed tenure, 'it's like this. You say to one of the more recently appointed teachers, "Go!" and he goeth. But you say to *me*, "Go!" and I say "Go to the devil!"'

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'I cannot tell how the truth may be.
I say the tale as't was said to me!'

• • • • •

So very many very funny things—most of them apocryphal, be it said—seem to emanate from the fertile brains of the primary school pupils, that the next thing we may expect to see will be a laughter-loving public booking front seats for the performances of these juvenile Joe Millers. Be that as it may, the following are vouched for by a writer in the current issue of the *B's Hum* as the *actual* productions of Board School Æsculapians.

'The Thorax is a very large bone which lies across your chest; if you was to put the bone on the fire it would run to a juice called gastric juice.'

'One lung has *two loaves*.'

'The gall-bladder is situated just under the liver, but on its south-eastern side.'

'Gall is very bitter, but it is worse if you get it in your eye.'

• • • • •

'How was it,' said the Diocesan Inspector, 'that the lions did not at once fall upon Daniel and eat him up?' This was a floorer, but one little chap, swelling with national pride, blurted out 'Because they was British lions, Sir!'

• • • • •

As an example of the curious misconceptions children are found to have fallen into when their written attempts are taken under consideration, the story is going the rounds that when recently a class of youngsters was asked to write out the Christmas Hymn, commencing 'Whilst shepherds watched their flocks by night,' one of them was found to have opened thus :—'While shepherds *washed their frocks by night*.'

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THE Right 'Notion' for the Month (see that the younger members of the staff write it upon the tablets of their memory)—

'Who does the best his circumstance allows,
'Does well, acts nobly; angels could no more.'
(*Night Thoughts*—YOUNG.)

NEW STARS.

BY R. A. GREGORY, F.R.A.S.

Honours Medallist in Physiography, Computer to the Solar Physics Committee, Author of 'Physical and Astronomical Geography.'

Of all the heavenly bodies, those which are viewed with most interest are undoubtedly comets and new stars. The reason is not far to seek. Both gleam out more or less abruptly from the blue canopy of Heaven and then disappear. Our curiosity is excited by their anomalous character, whilst ever-recurring phenomena, more wonderful and grand, are ignored. But this is not strange. The late R. A. Proctor said, 'The principal charm of astronomy, as, indeed, of all observational science, lies in the study of change—of progress, development, and decay—and especially of systematic variations taking place in regularly recurring cycles'; and the interest that has been taken in the new star which has recently appeared in Auriga gives every support to his expressions.

What is a new star, or a 'Nova,' as astronomers with a love of Latinised terms call the phenomenon? There are millions of stars shining in space which are never seen by the unaided eye; millions more, too faint to be grasped by the most powerful telescope manned with the best observer, leave their impression upon the photographic plate, and doubtless there are just as many bodies rolling and shining in space, veiled in the obscurity of immeasureable distance, or emitting only non-luminous radiations, as all those which have, up to now, revealed their existence. Thus, as old methods of research are perfected, and optical discoveries are utilised, more light is obtained and deeper soundings of the universe are rendered possible. But although by such means bodies demonstrate their presence in what may previously have been considered as a dark space in the sky, the term 'new star' is not applied to them. It is reserved for those which flash out in a portion of the immense void we call space, and, after acquiring a short-lived brilliancy, sink back into the obscurity from which they came. Such objects are not now looked upon by astronomers merely as curiosities, to be considered as freaks of nature and nothing more: they considerably extend our knowledge of the constitution of the universe, of the changes which accompany the birth, life, and death of worlds, and it is with the idea of tracing this evolution that this note has been written.

The New Stars of 1572 and 1604.

Before giving the facts concerning the discovery of the new star in the constellation Auriga, and the work that has been done in determining its constitution, it may be well to briefly notice some of the chief records of similar occurrences.

In 1572 a new star appeared in the constellation Cassiopeiae. When first observed it surpassed Sirius in its brilliancy, and even rivalled the splendour of the planet Venus, now so conspicuously visible in the evening sky. The star took about fifteen months to sink from its grandeur to invisibility, and, as it diminished in magnitude its colour merged from white, through yellow and red, to a leaden hue. Another new star shone out upon our benighted world in 1604. It was said at first to be as bright as Jupiter, and was visible for about a month longer that the new star of 1572 Many other bodies of the same class have been noticed from time to time, but none have matched the splendour of these two. And doubtless hundreds of new stars, whose births are unrecorded, have added their light to that of the innumerable host which fill the sky; have lived and had their day, unknown to the world. In pre-telescopic times only the objects which forced themselves upon the vision of mankind by the effulgence of their blaze were likely to be discovered. Others would be passed by unnoticed.

The New Star of 1866.

From the new stars of 1572 and 1604, of which Tycho Brahe and Kepler, respectively, left circumstantial accounts, we pass to the one that appeared in the constellation Corona in 1866. When this sent out its beams, astronomers had learned to use the spectroscope to determine the constitution of the heavenly bodies. It was natural, therefore, that almost directly after the star had been noticed an attempt should be made to analyse its light. And the coloured strip, into which the prisms decomposed the star-rays, was seen to be entirely different from any previously observed. The interpretation of the radiations was to the effect that hydrogen existed in the star's atmosphere in a state of incandescence. Carbon also appeared to be one of the constituents, and a ray—which is so constantly seen when the cloud-like masses in space are subjected to analysis, that it is called the 'nebula line'—glimmered in the spectrum of the body under examination. This was a fact worth recording. It established a relationship between stars and nebulæ, and is therefore of the highest importance. The star faded gradually, and its spectrum became simpler, until finally only a single representative of incandescent hydrogen remained.

The New Star of 1876.

Ten years after the appearance of the new star in the constellation of the Crown, one was discovered in that of the Swan; and a battery of telescopes, armed with spectroscopes, was soon directed to it. The analyses showed that brightest among its emanations were the ubiquitous radiations indicative of hydrogen, whilst other brilliant rays demonstrated the presence of the elements—carbon, sodium, iron and lead. But the most important line of all was one in the position of that which characterises nebulæ. As the star slowly diminished in brilliancy, all the rays, with the exception of this, suffered a corresponding decrease in intensity and faded away as the vapours they represented cooled down. The decrease of temperature, which prevented the elements in general from existing in an incandescent state, seemed to favour the development of the ray which connected the star with nebulæ. This line increased in brilliancy whilst all the rest were waning, and about eleven months after discovery the complex spectrum had entirely disappeared, the new star had become a very faint nebula, and, like many of the class of bodies to which it had been degraded, all its light was concentrated by the prisms into a single line. Upon any possible supposition the temperature at this time must have been lower than at the time of maximum brilliancy. And since the facts show that the new star in question cooled down to a body having nothing to distinguish it from a nebula, the idea that nebulæ represent the hottest denizens of space must be abandoned.

The New Star of 1885.

Nebulæ are really the most interesting objects in the heavens. Worlds seem to be formed by the condensation of the material of which these fleecy masses are made up. Tennyson describes them and star-clusters as:—

> Regions of lucid matter taking forms,
> Brushes of fire, hazy gleams,
> Clusters and beds of worlds, and bee-like swarms
> Of suns, and starry streams.

Hence, when it was announced in 1885 that a strange brightening could be distinguished in the centre of the Great Nebule in the constellation of Andromeda, it was thought that the time had arrived when some considerable additions to our knowledge might be obtained. And, although the anomalous luminosity did not attain any marked brilliancy, some new information was gained. An examination of the quality of the light emitted by the new star showed that carbon was chiefly responsible for its luminosity. But the fact of importance brought out by the observations was that the luminous radiations under consideration were precisely similar to those which distinguish comets. Since 1885 the rays of the Nova have been detected in the Andromeda nebula itself. The conviction is therefore forced upon us that the new star was but a hotter portion of the nebula, the increased temperature accentuating the radiations indicative of carbon.

Now let us sum up the facts. We have first that the Nova of 1866 exhibited a ray like that which is the family crest, as it were, of nebulæ. Next, the Nova of 1876 emitted the same rays as those which characterised a large number of nebulæ, and, as it diminished in brilliancy, and presumably decreased in temperature, the 'nebula line' increased in brightness. And, finally, the Nova of 1885 emitted light of the same nature as that given out by a comet when fairly near the sun. Obviously, then, new stars are intimately connected with nebulæ and with comets.

The New Star in Auriga.

Dr. Thomas D. Anderson, an amateur astronomer of Edinburgh, directed his 'inquiring eye' to the constellation Auriga on several occasions towards the end of January, and on the last day of that month satisfied himself that a strange star was visible in the portion of the sky under observation. The simplicity of his observing means will afford encouragement to even the humblest of amateurs. In a letter in *Nature*, of February 18, Dr. Anderson says: 'My knowledge of the technicalities of astronomy is, unfortunately, of the meagrest description; and all the means at my disposal on the morning of the 31st ult., when I made sure that a strange body was present in the sky, were Klein's "Star Atlas" and a small pocket telescope which magnifies ten times.' Having found that the star was not indicated in the map, Dr. Anderson sent an anonymous postcard to Professor Copeland, the Astronomer Royal of Scotland, announcing the discovery. The latter astronomer verified the discovery, and the welcome news was soon telegraphed to Observatories all over the world. The appearance of this little stranger caused as

much commotion in astronomical circles as is usually supposed to be developed when a little speck of humanity is ushered into the world. Professor Pickering, of the Harvard College Observatory, U.S., looked up his photographs of the region of the sky in which the new star was located, and found that the body had left its impression on negatives taken so far back as December 1, 1891. So, instead of bursting forth suddenly, as was at first supposed, the star had registered its birth and lived a span of life before the day on which it found itself famous. But this is not to be wondered at. It is more strange that such an inconspicuous body should ever have been noticed. On February 1, the world that had been called forth from a void was but of the fifth magnitude. It could, therefore, only be seen with the naked eye when the observing conditions were good. Since the date of discovery the star has diminished in brightness, and, so far as naked eye observations are concerned, has sunk to invisibility.

Professor Copeland made the first analysis of the new star's light on February 2nd. Rays of hydrogen and sodium were recognised, and other lines were seen, but not identified. February 3rd was fortunately a fine night, and full advantage was taken of it by Professor Lockyer at South Kensington. On this date the star was made to weave its pattern on a photographic plate, and from the positions of the impressed rays the quality of the light was determined. The existence of incandescent hydrogen and sodium was confirmed, carbon and calcium were detected, and the line which is characteristic of the spectrum of nebulæ was looked for and found in its place. So far the new body did not appear to be different from others of its class; but on February 7th a photograph was taken, under Professor Lockyer's direction, which enlarged our views considerably. The new fact brought to light by this picture was that the bright rays indicative of hydrogen were accompanied by dark rays on their more refrangible side. A word of explanation is necessary here. When a beam of light falls upon a prism of glass it is broken up into a rainbow-coloured strip, and at the same time is bent or refracted out of its original direction. The red end of this strip is not bent so much as the violet one, and is said to be the less refrangible end of the spectrum. The violet end of a spectrum is termed the more refrangible end. Professor Lockyer's discovery, then, was that the spectrum of the star showed bright hydrogen lines in testimony of the incandescence of this element, whilst dark lines proved that absorption was taking place. But if both the bright and the dark lines are due to hydrogen why are the latter nearer the violet end of the spectrum than the fofmer? The reason will be best understood from an analogy. Most individuals of an observant nature must have noticed that the shriek of the whistle of a locomotive appears to increases in pitch if the locomotive is approaching, but if the movement is away from the place of observation, the pitch is lowered. In the former case the number of vibrations which fall upon the ear and produces the sensation of sound is increased, and in the latter it is diminished. Now apply the analogy to a star spectrum.

When a star is at rest relatively to the earth, the lines of a particular substance, *e.g.*, hydrogen, occupy a certain position. If the star move towards the earth the same lines are shifted towards the violet end of the spectrum, their pitch, so to speak, is increased. Motion away from the earth causes the lines to be displaced towards the red end of the spectrum—causes the pitch to be lowered. The interpretation of Professor Lockyer's observation is, therefore, that the new star is made up of two bodies—one, giving a spectrum of dark lines, is moving towards the earth, and the other is receding. The relative velocity of these two bodies is something like 600 miles per second. The observations have been confirmed by Professor Pickering and Professor Vogel at Potsdam, so there seems no room to doubt that the luminosity has been caused by collisions of some kind. And the rapid fading of the star proves that large bodies could not have collided. The enormous amount of light and heat which would result from such an encounter was worked out by the late Dr. Croll. He said: Suppose two bodies, each half the mass of the sun, moving directly towards each other with a velocity of 476 miles per second. These bodies would, in virtue of that velocity, possess energy which, converted into heat by the stoppage of their motions, would suffice to maintain the present rate of the sun's radiation for a period of 50,000,000 years. The whole of the facts with regard to Nova Aurigæ and other new stars, appear to confirm Professor Lockyer's suggestion that the luminosity is produced by the collision of two swarms or streams of meteors in space. The appearance of a new star was once explained by the supposition that a mass of luminous matter had burst forth from a body covered with a non-luminous crust. The facts that have been accumulated with regard to Nova Aurigæ are in utter variance with this hypothesis. A collision, and nothing but a collision, will explain them. This seems to be now accepted by all astronomers, although at one time it met with considerable opposition. Only a fortnight before the appearance of the new visitor a paper 'On the Causes which Produce the Phenomena of New Stars,' by Professor Lockyer was published by the Royal Society. The whole question is there fully considered, and, so far, the conclusions arrived at are verified. What aspect the star will put on in its old age is now a matter of conjecture.

SCIENCE NOTES.

SUN-SPOTS AND MAGNETIC DISTURBANCES.—During February one of the largest spots hitherto observed crossed the sun's disc. The spot, or rather group of spots, was first seen on the east limb of the sun on February 5th. It passed the central part of the sun's visible hemisphere six days later, and disappeared round the west limb on February 17th. For a fortnight the group was invisible, being on the side of the sun turned away from the earth. It then appeared again on the east limb, and again passed the central meridian of the sun on March 8th. At Greenwich the area of spots is expressed in millionths of the sun's visible hemisphere. The group which appeared in February reached a maximum area on the 13th of the month. It then occupied 2,850 millionths of the sun's visible disc, corresponding to an area of 3,360,000,000 square miles, or about one-three-hundred-and-fiftieth of the face of the sun turned towards the earth. Its greatest length was about 150,000 miles, whilst the greatest width was, roughly, 75,000 miles. Thus it would take nearly nineteen bodies of the same size as the earth to span the length of the spot, about nine to reach across it, and seventy to fill up the gap. The period of rotation of the sun, deduced from observations of spots, is 25½ days. But on account of the movement of the earth in its orbit the average time taken by a spot in passing around the sun, and returning to the same position, as seen from the earth, in 27½ days. The period of rotation found by observing spots near the solar equator is about 25 days; for solar latitude 30°, it is 26½ days, and in solar latitude 40°, 27 days. The rate of movement cannot be followed further than 45° from the sun's equator, for spots are extremely rare in higher latitudes than this. Indeed, they are practically confined to two zones of the sun's surface between 5° and 40° of north and south solar latitude. The amount of spotted surface is subject to a periodic fluctuation, being at times much greater than others. The average period is about eleven years. At one part of a period the sun is rarely without spots, whilst at another part weeks or months may pass without a blemish appearing upon our luminary. A minimum of solar activity was passed in July, 1889. Since then the spots have been more numerous. A maximum will be reached about 1894, after which the activity will wane until about 1900. When sun-spots are most numerous auroral and magnetic disturbances are most frequent. There is abundant evidence in proof of the connection between these three phenomena, but the cause of the connection has not yet been well explained. Since, however, the fact is beyond doubt, it is not surprising that notable disturbanoes upon the sun should be accompanied by magnetic storms and brilliant auroræ. On February 13 magnetic instruments were violently disturbed, and continued disturbed all through the day and evening until Sunday afternoon. The variation in magnetic declination was more than one degree, and the other elements were caused to vary through similar large amounts. The disturbance was greatest during the night of February 13, when an aurora borealis was seen at several places. The widespread interest taken in these and kindred phenomena is a gratifying sign of the times, and a proof that the work of teachers in recent years to further scientific knowledge has not been in vain.

* * *

THE COLUMBUS MARINE BIOLOGICAL STATION.—Considerable interest attaches to the scheme of Professor Huxley, Professor Flower, Professor Ray-Lankester, Dr. Ball, Sir John Lubbock and others for establishing in Jamaica a marine biological station on the lines of the marine laboratory at Plymouth, to which attention has formerly been called in these columns. It is proposed by this means to celebrate the fourth centenary of the the discovery of the New World, and to do honour to the memory of Columbus. An outlay of £15,000 will be necessary to establish the laboratory on a sound basis, and an appeal is therefore made to the public for funds. Professor Ray-Lankester, while of opinion that the good permanent laboratory for the study of marine life which is required in the tropics would most suitably be located in Jamaica, thinks that the government of that colony should initiate the scheme and make the proposed laboratory part of a biological and physical survey of the coasts of the island. To carry out the scheme, 'an efficient, well-trained naturalist, who must be paid at least £700 a year for his services, and a government gun-boat with crew, etc., besides two or three special fishermen and attendants,' would be required, but there would, Professor Ray-Lankester thinks, be no difficulty in securing a suitable building.

DOES THE MISTLETOE INJURE ITS HOST?—Dr. Gaston Bonnier, Professor of Botany at the Sorbonne, in some recent interesting observations, contests the prevalent theory that the mistletoe injures the apple or other tree on which it grows. The relationship between them, he holds, is not one of simple parasitism, but rather of *symbiosis*. His observations on the increase in the dry weight of the leaves would seem to show that while in summer the mistletoe derives a large portion of its nutriment from its host, in winter it actually gives up to the latter part of its assimilated substance, for the increase in weight of the parasite is then less than the amount of carbon absorbed by it from the atmosphere.

* * *

DISSEMINATION OF THE TUBERCLE BACILLUS BY EARTHWORMS.—MM. Lortet and Despeignes, proceeding on the lines laid down by Pasteur in his investigations with the part earthworms play in bringing the spores of bacteria to the surface of the soil, have succeeded in demonstrating that *Bacillus tuberculosis* can be disseminated by this medium. They claim that this is the first occasion upon which invertebrate animals have been shown to be susceptible to tuberculisation.

* * *

THE INFLUENZA MICROBE.—The influenza bacillus, discovered by Dr. Richard Pfeiffer of the Koch Institute, is of a quite distinctive character. It is found in the purulent bronchial secretion which presents itself in all cases of influenza, but does not appear in cases of ordinary catarrh, inflammation of the lungs, and consumption. Dr. Kitasate, who has carried on the cultivation of the influenza microbe to the fifth generation, is of opinion that infection takes place through the sputum, which is surcharged with bacilli, and Dr. Canon, on examination made by him of the blood of twenty influenza patients, discovered the presence of bacilli in seventeen of these cases. In this connection the experiments of M. Chamberland in the laboratory of M. Pasteur are of much interest. He claims that no living disease germ can resist for more than a few hours the antiseptic power of essence of cinnamon. Even its scent kills them, and it does no harm to human beings.

* * *

BRACKEN IN ITS RELATION TO THE SOIL.—Some experiments lately instituted by Masclef in growing bracken (*Pteris Aquilina*) in different soils point to the conclusion that the nature of the soil affects not only the external form of plants, but their microscopical structure. While in siliceous soil the bracken reaches its full development, in calcareous soil its rhizomes are shorter, and its roots at the same time more numerons and more developed, while the structure of the subterranean stem shows a remarkable reduction of the tissue devoted to the storing up of reserve materials.

* * *

CAMBIAL ACTIVITY IN TREES.—M. Ince has lately instituted some interesting researches into the starting and cessation of the activity of the cambium layer in trees. While in young trees the woody zones are often larger in the middle and upper part of the trunk than at the base, in older trees the lower rings become more enlarged than the upper ones. M. Ince observes that in the trees examined by him, which included the oak, beech, hornbeam, lime, poplar, and fir, the activity of the cambium commences in the youngest shoots of the branches and stem, and extends sometimes successively, sometimes almost simultaneously, to the older part of the branches, and the middle and base of the trunk. Ten or fifteen days later it begins in the roots, and extends downwards from the larger portions of them to their very small branches. The swollen parts of the branches of isolated trees at their junction with the trunk is the seat of a cambial development almost simultaneous with that of the extremities. The activity of the cambium diminishes progressively until the end of summer. While in trees growing in a crowded state it disappears first in the lower branches and in their basal and median regions, in isolated trees the activity ceases first in the extremities of the branches and persists longest in the swelling at their bases. In the trunk the cambial activity is arrested first at the summit, proceeding in a downward direction to the base, and is ultimately confined to the portion of the trunk immediately below the surface.

* * *

TOBACCO AS A PROPHYLACTIC.—The many disciples of nicotine will hardly fail to appreciate the recent dictum of Dr. V. Tassarini of the Institute of Experimental Hygiene attached to the University of Rome, that in tobacco smoking we have a valuable prophylactic. He maintains that smoking in many cases destroys, and in any case retards the development of cholera, anthrax, and pneumonia bacilli.

* * *

THE SULPHONAL HABIT.—Now that Sulphonal is freely obtainable in the form of compressed tabloids, a word of warning as to the deleterious effects of this drug when taken in excess seems not out of place. In some cases recently treated at the Baden Baden Sanatorium, the writing of the patients, normally straight and distinct, became unsteady and sloped in an ascending line from left to right. With two of the patients the habit of indulging in this drug had become so confirmed, that when their supplies were stopped similar symptoms were caused to those experienced when overcoming the morphia habit.

* * *

EFFECT OF THE ELECTRIC LIGHT ON SIGHT.—Mr. Hartridge, who has lately been considering the question of what form of artificial illumination is best suited to the eye, pronounces judgment in favour of the electric light. While admitting that the arc light is unsuitable for indoor illumination, because of the fatigue resulting from its intense brilliancy and unsteadiness, and the large proportion of violet and ultra-violet rays which characterise it, he maintains that in the incandescent form, when carefully shaded and judiciously placed, it is the best and most satisfactory form of artificial illumination.

* * *

A NEW USE FOR ELECTRICITY.—In the United States Navy the aid of electricity has recently been directed in a novel direction. The Crocker Wheeler Company has placed four electric fans in the turrets of their iron vessel Miantonomah, with a view of blowing away the smoke from her guns.

* * *

HORTICULTURE AND THE COUNTY COUNCILS.—While it is desirable that the attention of County Councils should be directed to the scientific study of horticulture, the advice of the director of Kew Gardens given to the vice-chairman of the Middlesex County Council may be studied in this connection with much profit. 'The cultivation of plants,' Mr. Dyer says, 'is an art which can only be acquired by practice, and therefore it appears to me it cannot be taught in the lecture-room any more than painting or shoe-making. I know of no royal or theoretical road to the acquisition of a competent, or even useful knowledge of the gardener's art, except by beginning at the bottom and going through every operation, from the most elementary to the most difficult and refined. If an intelligent young man does that, and keeps his eyes open, he may become a successful gardener. But the mere reading of books and attendance on lectures will never, in my judgment, make anyone even a moderately competent gardener.'

—o—

LONDON MATRICULATION.

JUNE, 1892.

OUR PREPARATION CLASS FOR PRIVATE STUDENTS.

BY T. RUSSELL MALTBY, M.A.
Kingswood School, Bath.

(FOURTH MONTH.)

I. LATIN.

Notes on March Work.

Allen's Grammar, Sects. 149-153.

(1) Very full notes on these 'Principal Parts' were given in THE PRACTICAL TEACHER of September, 1891. Candidates are expected to distinguish between words differing only in the quantity of vowels.

(2) Distinguish carefully all forms of *mănĕo, mānō, mānē* (noun), *mānes* (noun); *dĭco, dīco; dŭco, dūco; pario, pareo, paro; prodo, prodeo; tego, texo; oblino, obliviscor; fido, fides* (noun); *venio, veneo, venero; proficio, proficiscor; lăbor, lābor; patior, pateo; areo, aro; dēdĕre, dēdēre; ĕdo, ēdo; lĕgo, lēgo; rĕfert, rēfert.*

(3) The following words also may easily be confused:—*Arma*, arms, *armus*, shoulder; *caelo*, I engrave, *cēlo*, I conceal; *cĕdo*, give, *cēdo*, I yield; *cēdo, caedo*, and *cădo; cŏmĕs*, companion, *cōmis*, affable, *cŏma*, hair, *cōmo*, I arrange; *cupĭdus*, desirous, *cupīdo*, desire; *decus* (*decŏris*), distinction, *decor* (*decōris*), grace, *decŏro*, I decorate, *decōrus*, graceful; *ĕs*, thou art, *ēs*, thou eatest, *aes*, bronze; *frĕtum*, sea, *frētus*, relying; *lēvis*, light, *lēvis*, smooth, *laevus*, left-handed; *lĕpus* (*lĕpŏris*), hare, *lēpor* (*lēpŏris*), elegance; *mălus*, bad, *mālus*, mast, *māla*, jaw, *mālum*, apple, *mālus*, apple-tree, *mālo*, I prefer; *nŏta*, mark, *nōtus*, south wind, *nōtus*, known; *ŏs*, bone, *ōs*, mouth; *pĭla*, ball, *pīla*, pillar, *pĭlus*, hair, *pīleus*, cap, *pīlum*, pike; *plăga*, region, *plāga*, blow; *păl̆us*, marsh, *pālus*, stake; *vŏmer* (*voměris*), ploughshare, *vōmo*, I vomit; *nĭdor*, vapour, *nīdus*, nest.

(4) Distinguish *libĕre, libēre; mŏri, mōri; sŏles, sōles; sĕcuris, sēcuris; vena, venum; sevĕris, sevēris; quaeritur, queritur; lātus, lătus; cāro, căro.*

(5) Parse *care, appellis, percrebuit, concentum, venibat, antiquitus, desierat, appelles, rexerit, regerit, mansere, contemplator, admorunt, amarier, satarum, poti, inseverit, face.*

(6) Construct rules for the formation of the perfect stem.

(7) Remember the rules for conjugating verbs of the 3rd conjugation in *io*, viz., *i* is omitted before *final e, -ĕr, another i.* The verbs are *capio, cupio, facio, fodio, fugio, iacio, pario, quatio, rapio, sapio, -cutio, -licio, -spicio.*

Allcroft and Haydon, Sects. 151-205.

(1) The work on prepositions is not sufficient. Supplement from *Allen, Sects. 318-363.*

(2) Look up the following prepositional phrases, and add them to the list of Sect. 151 :—*Ab hac parte, ab re eius, ad tempus, ad latera, ad hunc modum, omnes ad unum, apud Ciceronem* (two meanings), *apud se* (two meanings), *cum malo suo, de (ex) improviso, ex eius re, in peius, infra elephantos, inter se, inter os et offam, ob oculos, ob rem, per iocum, prae magnitudine, pro hac vice, pro virili parte, supra morem.*

Latin Course for April.

1. *Allen's Grammar, Sects. 154-163.* (Genders of Nouns, Notes on Declensions, Comparison of Adjectives, Anomalous and other Substantives.) These pages will require a great deal of work. Most candidates will find it convenient to learn the rules for gender in rhymed form. We advise them also (see PRACTICAL TEACHER for last September) to construct lists of Noun in six columns, viz. :—(1) Nom. Sing., (2) Gender, (3) Meaning, (4) Ablative Sing., (5) Genitive Plur., (6) Other points, *e.g.* :—

Perses	m.	Persian	*Persē (ā)*	*Persarum*	voc. *Persa*
sitis	f.	thirst	*siti*	no. plur.	acc. *sitim*
tigris	m.f.	tiger	*tigride, tigri*	*tigrium*	ac. *tigrin, tigrida*
senex	m.	old man	*sene*	*senum*	
vis	f.	force	*vi*	*virium*	*vi* for dat. rare
grus	m.f.	crane	*grue*	*gruum*	
vas	m.f.	bail	*vade*	wanting	
vas	n.	vessel	*vase*	*vasorum*	nom. pl. *vasa*

2. *Allcroft and Haydon, Sects. 206-259.*

3. *Allcroft and Haydon, Exercises XI., XII., XIII., XIV., XV., XVI.* A's and B's only. 90 sentences.

4. *Vergil, Aeneid VII., 1-405.*

5. *Translation at Sight. Hardy's Reader,* Nos. 67, 69, 70, 71, 80, 89, 94, 95. See February notes.

II. GREEK.

Course for April.

1. *Abbott and Mansfield, Sects. 163-168* (Principal Parts. Words differing in meaning according to their accent).

2. *Abbott and Mansfield, Syntax, Sects. 33-52* (Prepositions).

3. *Xenophon, Anabasis IV., Chapters V. and VI.*

4. *Translation at Sight. Initia Graeca, Part II.* Tales and Anecdotes, Nos. 11, 12, 13; Mythology, No. VI. (Herakles); Grecian History, No. IV. (Building of the Walls of Athens). Make a *written* translation of the last piece.

FRENCH.

Notes on March Work.

Breymann. Articles and Nouns.

(1) Distinguish *donnez-moi de bon pain* and *donnez-moi du bon pain; des beaux-frères* and *de beaux-frères.*

(2) Sect. 167 implies the following important rule :—*the partitive genitive depending on any adverb of quantity, except bien, does not take the article.* Remember also *bien d'autres.*

(3) What is the singular of *étaux*? Distinguish *feux* and *feus.*

(4) Rule for the plural of *ail* :—*ails* is the botanical expression, *aulx* is used in familiar conversation.

(5) 'Skies in pictures,' *i.e., ciels de tableaux*; 'testers,' *i.e., ciels-de-lit.*

(6) *Bercail and bétail* have no plural; *bestiaux* has no singular, but is sometimes used as the plural of *bétail.*

(7) Plural of compound nouns: after *timbre-poste* add *reine-claude, fourmi-lion*; after *pied-à-terre* add *vol-au-vent* (see Dictionary).

(8) Nouns used only in the plural: add *débris, gens, vacances* (holidays), *hardes* (old clothes).

(9) Nouns differing in meaning according to their number: add *grâce* (pardon—charms), *herbe* (grass—herbs).

(10) Feminine of nouns: add *mouton, brebis; bouc, chèvre; cerf, biche; cheval, jument; coq, poule; singe, guenon; taureau, vache; ours, ourse* (see Dictionary).

French Course for April,

1. *Breymann, Chapter IV.* (Adjectives) *and Chapter V.* (Pronouns) *to the end of Interrogative Pronouns.*

2. *Fasnacht, Extracts 17, 18, 19, 24, 30, 31, 33, 41, 42, 43, 66, 67, 69, 72, 73.*

3. *Written translations* of 18, 24, 30, 41 in the above list. Continue Professor Darqué's *La Jeune Sibérienne.*

4. *Word-Lists* and *Phrase-lists.*

III. ENGLISH.

Course for April.

1. *Mason pp. 62-112* (Verbs and Adverbs). Mark all definitions, as Mood, Transitive, etc. Note in passing what is said about special usages (*e.g.*, 'the bait took'). Learn the uses of the subjunctive in Anglo-Saxon and modern English. Sect. 196 (on the infinitive) might well be learned entire. Follow the discussion of the origin of the Gerund. Other important parts are the tense-system, the uses of *shall, will, should* and *would*, special uses of certain tenses, origin of strong and weak verbal forms, and all the work on Defective and Anomalous Verbs. 'Principal Parts' should be learnt according to some classification. Note the strong verbs which have become weak, and the apparently unique history of the strong verb *wear*, which was originally weak.

2. Test your work in *Mason* by means of the questions on pages 108, 196 of *Hewitt and Beach.* Then supplement *Mason* from *Hewitt and Beach*, pages 111-211.

3. *Ransome's History, 1603-1628, with the Geography relating thereto.*

IV. MATHEMATICS.

Notes on February Work.

(1) How would you work the following?—

$$1 + 2357947691\,x^9 \div 1 - 11x + 121x^2$$

(2) To solve :—

$$\frac{x-a}{b+c} + \frac{x-b}{a+c} + \frac{x-c}{b+a} = 3.$$

$$\frac{x-a}{b+c} - 1 + \frac{x-b}{a+c} - 1 + \frac{x-c}{b+a} - 1 = 0$$

$$\therefore \frac{x-(a+b+c)}{b+c} + \frac{x-(a+b+c)}{a+c} + \frac{x-(a+b+c)}{b+a} = 0.$$

$$\therefore x-(a+b+c) = 0 \text{ and } x = a+b+c.$$

(3) $$\frac{ax^2+bx+c}{mx^2+nx+p} = \frac{a}{m}$$

$$\therefore \frac{ax^2+bx+c-ax^2}{mx^2+nx+p-mx^2} = \frac{a}{m} \quad \text{(See rules of Ratio).}$$

$$\therefore \frac{bx+c}{nx+p} = \frac{a}{m}, \quad \therefore \text{ etc.}$$

Course for April.

1. *Arithmetic, Capel, Part VI.* (Miscellaneous subjects). Take regular practice in answering Matriculation questions.

2. *Algebra, Simultaneous Equations, Quadratic Equations and Theory thereof.*

3. *Hall and Stevens's Euclid, pp. 144-148* (Theorems and Examples on Book II.) *and pp. 184 to 214* (Book III. from Prop. 20, with Exercises).

V. MECHANICS.

Magnus, Chapter VII.—Theory of Equilibrium.

VI. CHEMISTRY.

Kemshead, Chapters V., X., XI., XIII.—Oxygen (not Ozone), water (not Hydroxyl), Carbon, Carbon Monoxide, Carbonic Dioxide. Take practice in working out chemical calculations.

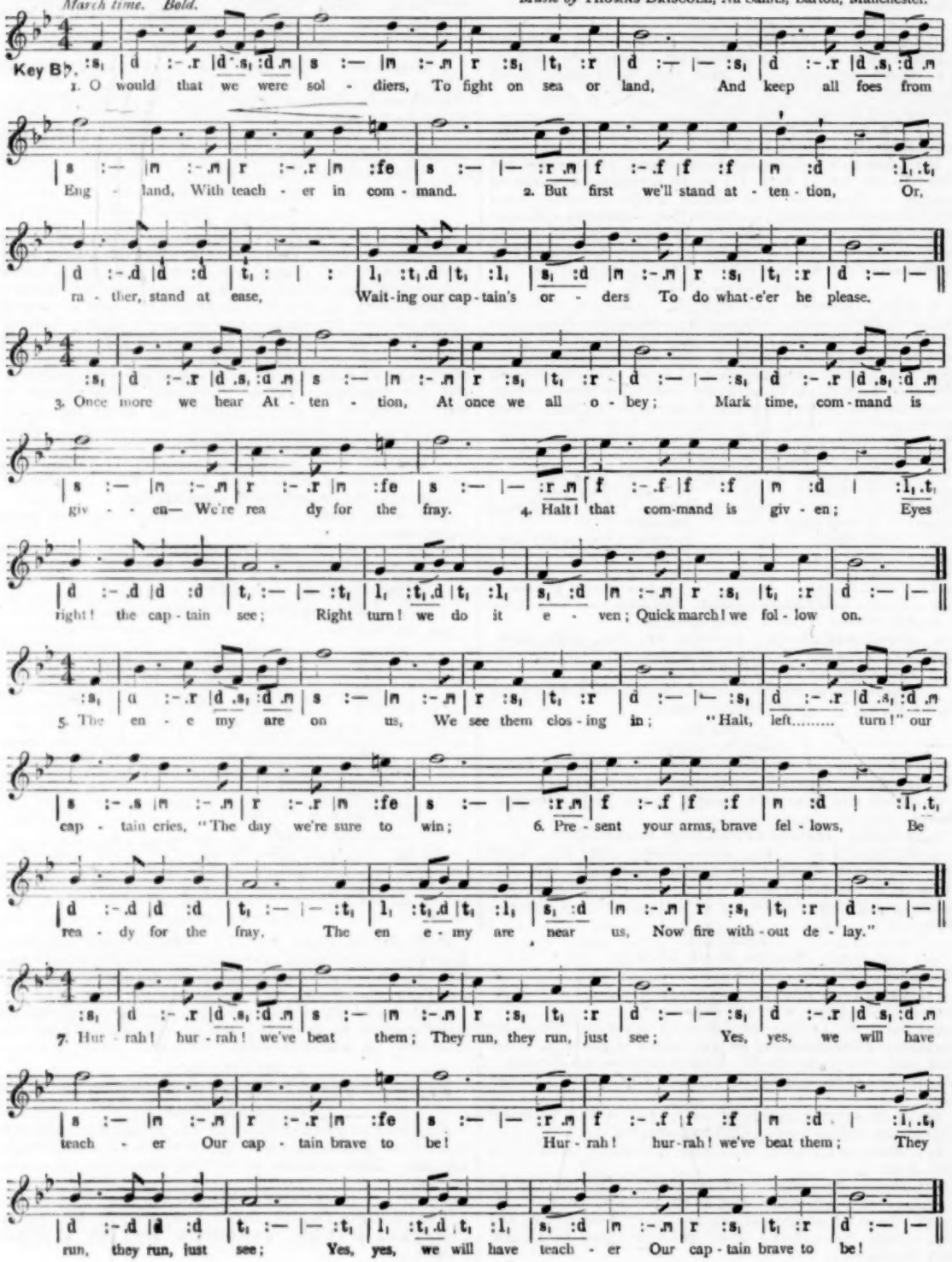
LIGHT AND HEAT.

Stewart, Light, Chapters I.-IV. (Introductory, Rectilinear Propagation of Light, Photometry, Reflexion at Plane Surfaces).

Prize Song.]

LITTLE SOLDIERS.

Words by A. J. BEAVIS, 28, Nelson Road, Ilkley. *Music by* THOMAS DRISCOLL, All Saints, Barton, Manchester.

March time. Bold.

Key B♭.
1. O would that we were sol - diers, To fight on sea or land, And keep all foes from
Eng - land, With teach - er in com - mand. 2. But first we'll stand at - ten - tion, Or,
ra - ther, stand at ease, Wait-ing our cap-tain's or - ders To do what-e'er he please.
3. Once more we hear At - ten - tion, At once we all o - bey; Mark time, com-mand is
giv - - en— We're rea dy for the fray. 4. Halt! that com-mand is giv - en; Eyes
right! the cap - tain see; Right turn! we do it e - ven; Quick march! we fol - low on.
5. The en - e my are on us, We see them clos - ing in; "Halt, left..... turn!" our
cap - tain cries, "The day we're sure to win; 6. Pre - sent your arms, brave fel - lows, Be
rea - dy for the fray, The en e - my are near us, Now fire with - out de - lay."
7. Hur - rah! hur - rah! we've beat them; They run, they run, just see; Yes, yes, we will have
teach - er Our cap - tain brave to be! Hur - rah! hur-rah! we've beat them; They
run, they run, just see; Yes, yes, we will have teach - er Our cap - tain brave to be!

OUR PRIZE COMPETITIONS.

I.—ERROR PRIZE.

The first to point out an error in the March supplement was—

Mr. H. STURGESS,
Board School,
Hollymoor Side,
Chesterfield.

To whom a cheque for Half-a-Guinea has been sent.

☞ We offer a prize of Half-a-Guinea to the Teacher who is the first to point out an error in the answers to the set of Problematic Test Cards for Standard VI., which will form our May supplement.

II.—PRIZE ACTION SONG.

The Judge has awarded the prize to—

Mr. T. DRISCOLL,
All Saints' School,
Barton, Manchester.

To whom a cheque for One Guinea has been sent.

III.—PRIZE ANECDOTES.

This month we have had considerable difficulty in making the award. We have therefore decided (instead of the Half-Guinea prize) to give to each of the following six competitors 2s. 6d. P.O.O. for that amount have been sent.

☞ **We again offer a prize of Half-a-Guinea for the most amusing anecdote connected with school life. For conditions see p. 532 of March Number.**

Forwarded by Mr. ALEXANDER MACKAY :—

'West Banks School,
'Wick, N.B.,
'8th March, 1892.

'While taking the Bible lesson in one of the higher classes, the question of Solomon's having three hundred wives came up for discussion. On putting the question, whether or not it was right for Solomon to have so many wives, the answer came promptly "no." Having asked if the pupils could give any quotation from Scripture against a man's having more wives than one, a timid fair-haired girl quietly and softly repeated :—

'"A man cannot serve two masters."'

Forwarded by Miss ALICE H. DOUGLAS :—

'Mistress, Poundgate School,
'Buxted, Sussex.

'I requested my First Class to write a short composition on Useful Animals. The following was the production of one little girl :—"The zebra is a very useful animal. It is very pretty. It has long legs, and can run very fast. It is covered all over with beautiful stripes. A very useful article is made from this animal. It is called Zebra Blacklead."

'The following definition, given by a boy in the same school, is fairly original :—

'"Unamiable—can't aim straight."'

Forwarded by Mr. HENRY ASKEW :—

'Clayhanger,
'Brownhills, Walsall.

'An interchange of civilities was kept up between the different departments of a large Board School in the Midlands. Amongst other things, a key or spanner for tightening the screws which fix the desks at the right slope was much in demand by either one department or the other. One afternoon a timid rat-tat broke the stillness which pervaded the boys' department. An assistant left his post to ascertain who knocked. His astonishment may be imagined when he was accosted by a small girl thus : "Please, sir, will you lend me your key, 'cos Miss C—— *has a screw loose ?*"'

Forwarded by Miss IERNE :—

'St. Philip's Girls' School,
'Arundel, Sussex.

'A small Standard I. in our infant school was reciting a poem in which the words "poverty, work and woe" occurred. The manager happening to walk in as the verse containing these words was in progress, questioned the children as to their meaning.

'"Poverty and work" were soon disposed of, but when it came to 'woe," the little faces wore a puzzled look.

'At last up went a hand, a pair of bright eyes danced with glee, and the answer rang out triumphantly :—

'"Please, it's what you says to a hoss when you wants 'im to stop!"'

Forwarded by Mr. JAS. GILLMOUR :—

'70, Scotch Street,
'Whitehaven, Cumberland.

'At a recent examination the scholars were asked to write an essay on "Cleanliness." One boy commenced with "Cleanliness is extracted from soap."'

Forwarded by W. R. ROBINSON :—

'Lowther Street Board School,
'Carlisle.

'GEORGE POTTS.—STANDARD V.

'TEMPERANCE.

'It is a good thing for your pocket. If you don't want to be drunk when you grow up to be a man it is best to begin when you are young. It has caused the deaths of hundreds, and many old folks have had to go to an early grave through this wicked curse. When a man is steady he can eat a good dinner for himself and family ; but when he gets drunk, the Good Templars try to straighten him up and get him to sign the pledge not to drink any more drink. Good Templars are kind fathers, and buy their little boys new suits and boots, and live in clean houses and do not kick their wives ; so it is best not to be a drunkard.'

PUBLICATIONS REVIEWED.

The Theory and Practice of Perspective Projection. By E. G. Baker, B.Sc., B.A. London: Joseph Hughes and Co.

In this quarto volume the author has collected and revised the series of papers he contributed to the pages of this journal. The introduction contains a very clear explanation of the principles of Orthogonal Projection, with numerous exercises, and a short account of conical projection. The rest of the book includes a large assortment of problems in Perspective Projection, with the principles clearly stated, abundant practical directions, and more than one hundred carefully drawn figures. The subject is one in which no amount of mechanical copying will suffice to prepare the student for an examination : hence the value of the many exercises for which Mr. Baker gives all needful help without showing the completed drawing.

We can confidently recommend the work as a trustworthy guide for pupil-teachers and other students.

Milton's Paradise Lost. Books V. to VIII. With Notes by C. M. Lumby. Cambridge : Deighton, Bell, and Co.

As no preface or introduction precedes the text of this portion of Milton's great epic, we may presume that the earlier portion has already appeared in this edition. The text is well printed, and the notes are of the most serviceable kind. Mr. Lumby has not fallen into the common fault of over-annotating. While the text occupies more than 80 pages, the notes are printed on less than 40. They are, however, such as the student is most likely to need, and such as will add definite interest to his study. The cosmogony of Milton's poem, and the many references to the astronomical system formerly received are very carefully treated.

Cornhill (March). London : Smith, Elder and Co.

An excellent number. 'The Slave of the Lamp' becomes increasingly interesting, 'Autumn Circuits' is a bright, chatty instalment of literary flavour, and the 'Silver Lining Claim' is a sketch well worth reading.

The School Calendar. London: Whittaker and Co., and Geo. Bell and Sons.

This Calendar and Handbook of Examinations, Scholarships, and Exhibitions makes its sixth annual appearance with a suitable preface by the accomplished editor of the *Journal of Education*, Mr. F. Storr. Handy as to size and beautifully printed, it is brimful of useful information. In our opinion the 'calendar' is indispensable to every secondary teacher in the kingdom. So highly do we think of it, that we wish the enterprising publishers would issue a similar volume for elementary teachers.

Unrivalled Memory Maps. Set of 32. Edinburgh and London: W. and A. K. Johnston.

The execution of these maps is equal, if not superior, to that of any series we have seen produced for the same purpose. They are printed on thick paper of excellent quality. We notice one or two points, however, which are likely to interfere with their usefulness as models for drawing maps from memory. A heavy black coast-line, bordered by a thick blue line, in addition to the lighter blue tint for the general sea surface, gives a rather blurred and confused appearance, where it is highly important that the impressions should be bold and clear. This is particularly noticeable in such maps as Scandinavia and the Mediterranean Sea. Thick black lines are suitable for representing mountains in memory maps, but when they are very numerous, and for the most part without identifying names, as in Scotland and Switzerland, they fail to help the memory. The type, also, of most of the names printed is too small for the pupil to be expected to imitate it.

The Royal Atlas Reader. No. VII.—The United States. London: T. Nelson and Sons.

Produced in the well-known style of the enterprising publishers, this book may safely be recommended for use in any class where the geography of the United States is a subject of study. The lessons treat in an interesting way of the history and growth of the States, as well as their natural, social, and political characteristics. Thus we find chapters on the Discovery of America, on the Pilgrim Fathers, on George Washington, on the Negro Race, on Abraham Lincoln, and also on the Prairies, the Yosemite Valley, and the Wonderland of the Rocky Mountains. Other chapters deal with the animals and plants of the country.

The illustrations are excellent and numerous, but we think the duplication of the full-page picture of the Capitol, Washington, must be the result of oversight.

A good summary for memory work is given at the end of the book, where, also, we find lessons on Climate, Tides, Ocean Currents, and other allied topics.

Macmillan's History Readers for Standards III. and IV. London: Macmillan and Co.

Strongly bound in neat cloth boards, beautifully printed on excellent glossy paper, and abundantly illustrated with charming woodcuts, these volumes win one's admiration at first sight. As to the matter, the chapters have been specially written by competent hands, and, many as are the historical readers it has fallen to our lot to examine, we remember none in which the treatment has been fresher or more attractive. The style bears traces of the influence of Green, but it is simplified sufficiently to be interesting to children of the standards for which the books are intended. A few ballads and poetical extracts are included in each book, but none of them are hackneyed pieces. Indeed, there is not more than one of them that we can recall as having appeared in any similar books. The periods dealt with correspond to the history requirements of Schedule II. of the Education Code. Brief notes are appended to each lesson, and spelling lists, summaries, chief dates and tables of descent are printed at the end of each book. These readers seem to us in every way worthy of the most cordial commendation.

Selected Poems from Wordsworth. London: Cassell and Company, Limited.

This addition to the remarkably cheap series known as Cassell's National Library is a real treasury of poetical gems. Professor Henry Morley supplies a brief introduction, but the selection of poems has been made by Mr. R. F. Charles, M.A., one of the Masters of the City of London School. Excellent taste and sound judgment are displayed in the selection, which includes more than one hundred of Wordsworth's best poems, among them being the lines on Tintern Abbey, the Ode to Duty, the Ode on Immortality, Laodamia, many of the exquisite lyrics, the pastoral Michael, and over thirty of the sonnets. Each poem is given in complete form, extracts from the longer poems being excluded on the ground that 'elegant extracts are flat treason against Art.' The little volume may worthily be made a constant pocket companion.

The Elements of Agriculture: A Text-book prepared under the authority of the Royal Agricultural Society of England. By W. Fream, LL.D. London: John Murray.

The preparation of this text-book was undertaken by the Royal Agricultural Society, in compliance with the many demands that had been addressed to it for an elementary work on Agriculture. The general scheme was drawn up by a committee, of which Lord Moreton was the chairman; the writing of the book was entrusted to Dr. Fream; and the proof sheets have been revised by the most eminent scientific farmers and agricultural specialists in the country.

The book itself is its own best recommendation. 450 pages, 200 specially made illustrations, and a neat and serviceable binding make it the best value for money ever issued by the illustrious publishers whose imprint it bears. We can suggest but one or two points for the next edition, which must soon be demanded, viz., a list of reference books on the subjects treated of, and some account of an industry peculiarly suitable for wide introduction—poultry farming. The remainder of our available space we shall devote to giving our readers some account of the subjects treated on in this invaluable work.

It is divided into three parts: The Soil; The Plant; The Animal. Much of the first part is common to all text-books on Agriculture, though the treatment is fresh and unhackneyed, but the latest results are given, and full analyses are provided. The chapter of loss and gain to soils, and that of the improvement of soils, are specially good, while that on manures and manuring is excellent.

In Part II., Chapters XI. and XII., Cultivated plants and weeds, are specially valuable. Each plant and weed is described in familiar language, and its peculiarities noted. The way of dealing with each weed is explained. Chapters on the management of grass land and on farm crops are very full; silage is discussed; and we then come to Chaps. XVII. and XVIII., Fungus Pests, and Insect Pests. These are described and figured, and their modes of eradication laid down.

Part III. deals with the Animal, the art of breeding horses, cattle, sheep, and pigs; their fattening; and finishes with a very important chapter on dairy work.

We have said enough to indicate the wide range this book takes. It covers all the Advanced Stage Syllabus, and will, we fancy, have a wide future before it, and become *the* standard class book on the subject. But besides teachers of agriculture and advanced students, to whom it will be absolutely indispensable, we can recommend it to all who desire to know something of the botany and insects of our fields. The chapters on cultivated plants and weeds are alone well worth the money to many a town teacher, and those on fungus and insect pests to the country schoolmaster.

In every respect this book cannot fail of being a great success, and of adding credit to its originators, author, and publisher.

We have now the pleasure to give in another column particulars of our Free Insurance Scheme, as promised in our last issue. Our original intention, and we strove hard to accomplish it, was to insure our subscribers for £1,000, irrespective of death by Railway Accident, Conveyance, or whilst engaged in School Duties.

But the Directors of the Ocean Accident and Guarantee Corporation (Limited), after mature deliberation, decided that the undertaking was too great to embark upon.

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* * *

We trust, therefore, our Readers are satisfied with the arrangements made, and that they will show their appreciation thereof by making them known to their friends in every part of the United Kingdom.

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To the many hundreds of teachers who have unreservedly expressed their warm appproval of our efforts during the past few months, we tender our sincere and cordial thanks, and regret our inability to reply to each one personally.

* * *

But to our muttons, as the French hath it. Numerous queries have reached us anent the Scheme, queries which are fully answered by the conditions set forth in the next column.

The Easter and Summer holidays—when teachers are on the wing—will soon be upon us, and a little forethought *now* may avert untold anxiety, and possibly poverty in the future.

We cannot, therefore, too strongly urge upon our Readers two or three points.

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Algebra.

CELIA.—The sum of the squares of the antecedent and consequent of a ratio is 181, and the product of the antecedent and consequent is 90. What is the ratio? (*Hamblin Smith.*)

Let x and y be the terms,

Then (1) $x^2 + y^2 = 181$
(2) $xy = 90$
(1) $x^2 + y^2 = 181$
(2) $2xy = 180$

Adding $x^2 + 2xy + y^2 = 36$

Subtracting $x^2 - 2xy + y^2 = 1$

$\therefore x + y = \pm 19$
$x - y = \pm 1$

$2x = \pm 18$ or ± 20
$2y = \pm 20$ or ± 18
$\therefore x = \pm 9$ or ± 10
$y = \pm 10$ or ± 9
$\therefore$ Ratio is $9 : 10$,
or $10 : 9$.

POET.—Solve:—

$y^4 - 432 = 12xy^2$
$y^2 = 12 + 2xy$

(*Foster's Examples in Algebra.*)

(1) $y^4 - 432 = 12xy^2$
(2) $y^2 = 12 + 2xy$

(1) $y^4 - 432 = 12xy^2$
(2) $\times 36$ $36y^2 - 432 = 72xy$

$y^4 - 36y^2 = 12xy^2 - 72xy$
$y^2(y^2 - 36) = 12xy(y - 6)$

Dividing by $y(y - 6)$ $\therefore y(y + 6) = 12x$.

As we divided each side by $(y - 6)$, we can put $y - 6 = 0$
$\therefore y = 6$.

(2) $y^2 = 12 + 2xy$
$36 = 12 + 12x$
$3 = 1 + x$
$\therefore x = 2$.

$\therefore x = 2$ and $y = 6$.

Mensuration.

A. LORIMER.—A conical-shaped wine-glass, two inches deep and two inches across the rim, is three-quarters full of wine. How many grapes, half-inch in diameter, can be put into the glass without the wine running over?

Content of glass $= \frac{1}{3}(2^2 \times \cdot7854 \times 2)$ cub. in.
Space left $= \frac{4 \times \cdot7854 \times 2}{3 \times 4}$ "
$= (\cdot2618 \times 2)$ "
$= \cdot5236$ "
Content of each grape $= (\frac{1}{2}^3 \times \cdot5236)$ "
$\therefore$ Number of grapes $= \cdot5236 \div \frac{1}{8}$ of $\cdot5236$.
$= 8$. Ans.

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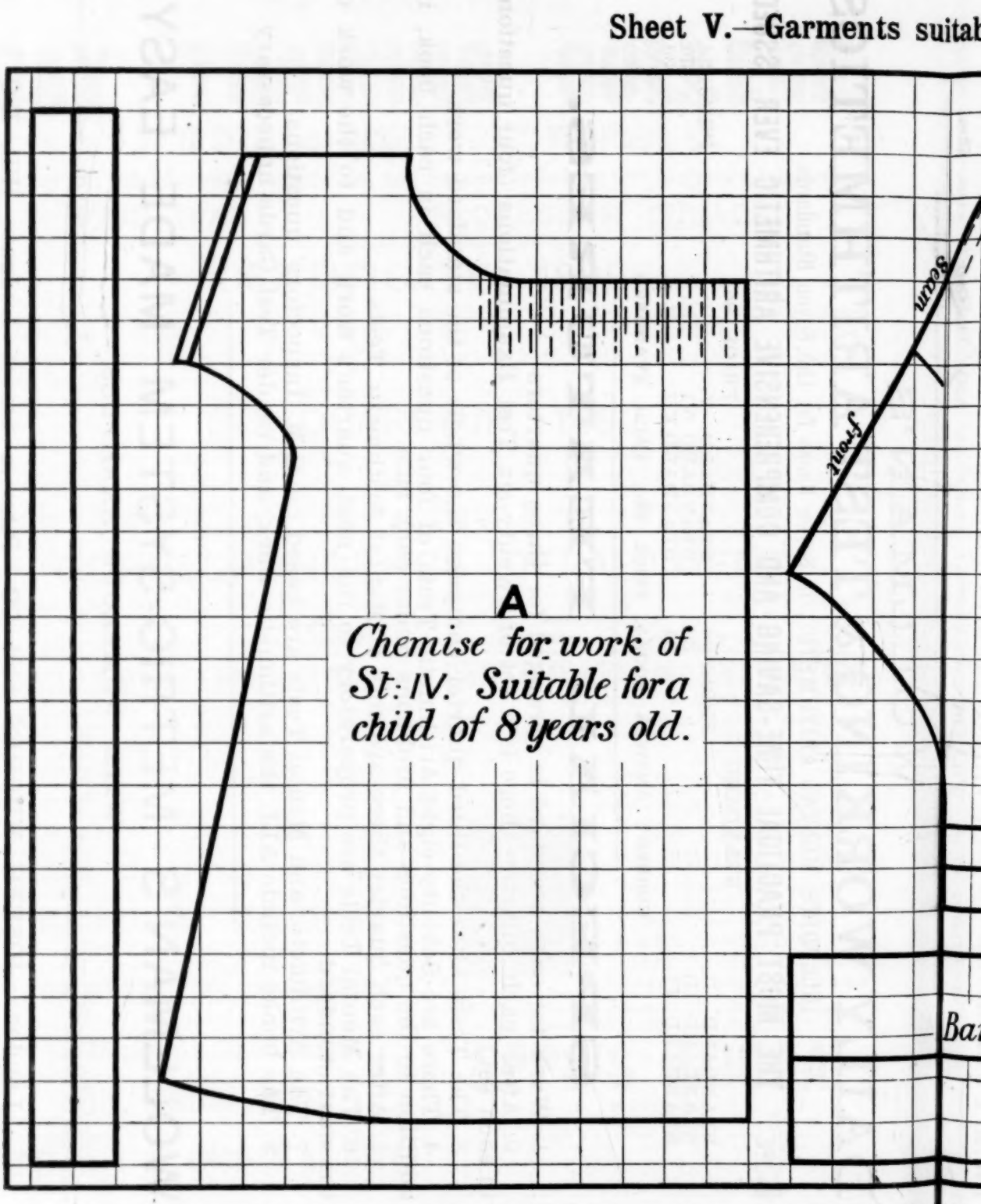

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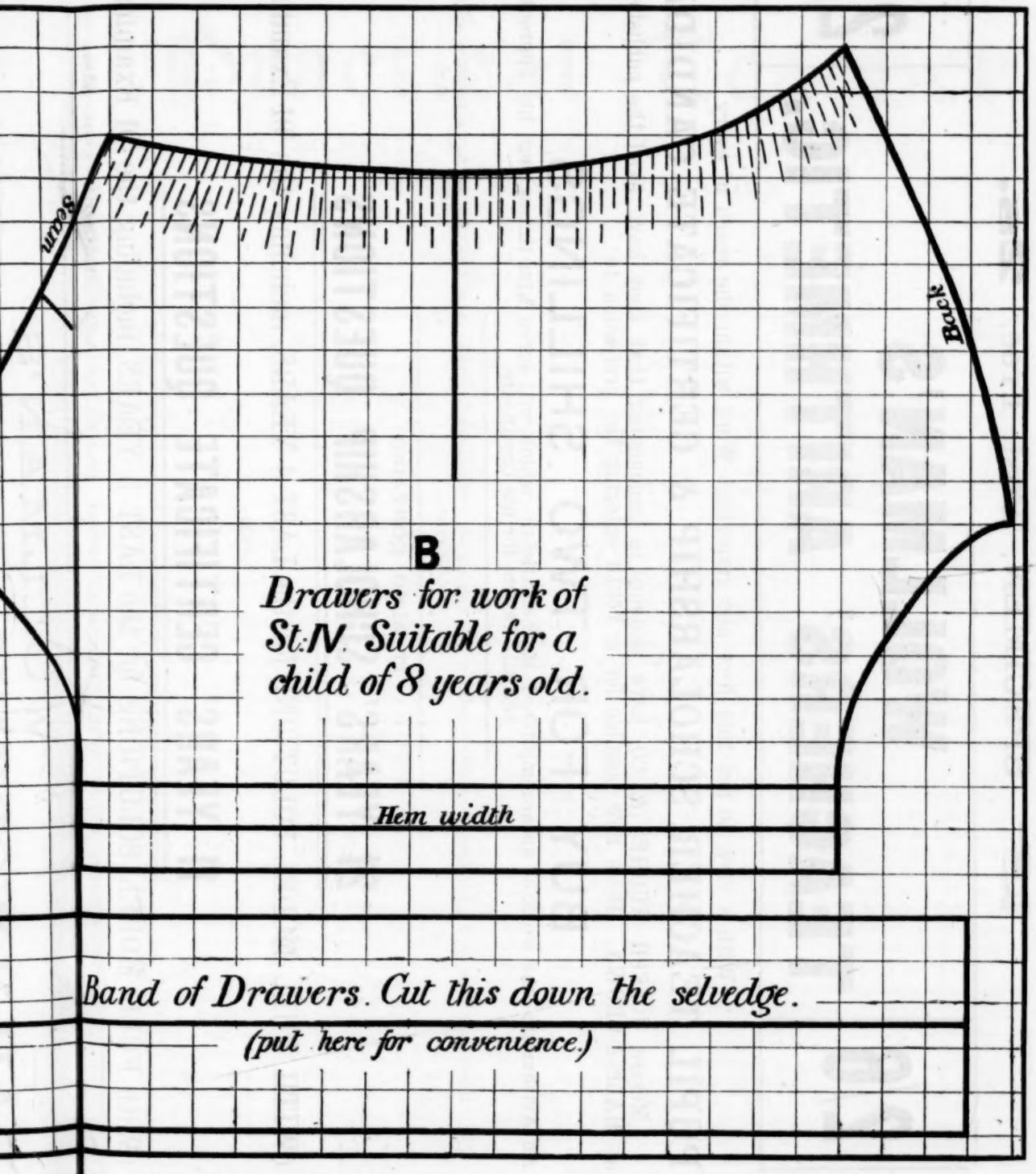
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